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Project No. 3472 Permit No. 11656

SOURCE EVALUATION REPORT

Saint-Gobain Containers, Inc.
Seattle, Washington

Glass Melting Furnace No. 5
Cloud Chamber Inlet
Total Chrome

March 11, 2010

Test Site:
Saint-Gobain Containers, Inc.
5801 East Marginal Way S.
Seattle, Washington 98134

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1. CERTIFICATION

1.1 Test Team Leader

I hereby certify that the test detailed in this report, to the best of my knowledge, was accomplished in conformance with applicable rules and good practices. The results submitted herein are accurate and true to the best of my knowledge.

Name: Preston Skaggs

Signature ______________ Date 2010 04 13

1.2 Report Review

I hereby certify that I have reviewed this report and find it to be true and accurate, and in conformance with applicable rules and good practices, to the best of my knowledge.

Name: David Bagwell, QSTI

Signature ______________ Date 4/18/10

1.3 Report Review

I hereby certify that I have reviewed this report and find it to be true and accurate, and in conformance with applicable rules and good practices, to the best of my knowledge.

Name: Michael E. Wallace, PE

Signature ______________ Date 4/19/10

2. INTRODUCTION

2.1 Test Site: Saint-Gobain Containers, Inc.
5801 East Marginal Way S.
Seattle, Washington 98134

2.2 Mailing Address: 1509 S. Macedonia Avenue
P.O. Box 4200
Muncie, IN 47307-4200

2.3 Test Log:
Glass Melting Furnace No. 5, Cloud Chamber Inlet: Total Chrome

Test Date	Run No.	Test Time
March 11, 2010	1	08:25 – 10:28
"	2	10:50 – 13:57
"	3	14:10 – 17:16

Summary: One valid 120-minute run (Run 1) and two valid 180-minute runs (Runs 2 and 3).

2.4 Test Purpose: To demonstrate compliance with the National Emission Standard for Hazardous Air Pollutants for Glass Manufacturing Area Sources, 40 CFR Part 63, Subpart SSSSSS for affected sources.

2.5 Background Information: None

2.6 Participants:
Horizon Personnel:
Preston Skaggs, Team Leader
Neil A. Young, Field Technician
Michael E. Wallace, PE, Calculations and QA/QC
David Bagwell, QSTI, Report Review
Christopher D. Lovett, Technical Writer
Test Arranged by: Jayne Browning, Saint-Gobain Containers, Inc.
Observers:
Plant Personnel: Marlon Trigg, Saint-Gobain Containers, Inc.
Agency Personnel: Gerry Pade, PSCAA
Test Plan Sent to:
PSCAA: Gerry Pade
USEPA Region 10: Madonna Narvaez

3. SUMMARY OF RESULTS

3.1 Table of Results:

Table 1

Furnace No. 5, Cloud Chamber Inlet – Total Chrome Test Results

Test Date: March 11, 2010

Sampling Results	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**
Start Time		08:25	10:50	14:10	
End Time		10:28	13:57	17:16	
Sampling Time	minutes	120	180	180	160
Sampling Results					
Total Chrome					
Concentration	µg/dscm	631	653	645	643
Rate	lb/hr	0.022	0.022	0.021	0.022
Production-Based	lb/ton	0.0070	0.0071	0.0068	0.0070
Subpart SSSSSS Limit	lb/ton				0.02
Sample Volume	dscf	55.2	82.4	86.8	74.8
Sample Volume	dscm	1.6	2.3	2.5	2.1
Percent Isokinetic	%	91	93	101	95
Sample Weight, Total	µg	986	1523	1586	1365
O_2	%	19.0	19.2	19.0	19.1
CO_2	%	3.6	3.0	3.8	3.5
Source Parameters					
Flow Rate (Actual)	acf/min	16,900	16,000	16,000	16,300
Flow Rate (Standard)	dscf/min	9,330	9,150	8,850	9,110
Temperature	°F	408	379	399	395
Moisture	%	8.2	8.1	8.6	8.3
Process/Production Data					
Glass Pull Rate	ton/hr	3.13	3.13	3.13	3.13

3.2 Discussion of Errors and Quality Assurance Procedures: This table is taken from a paper entitled "Significance of Errors in Stack Sampling Measurements," by R.T. Shigehara, W.F. Todd and W.S. Smith. It summarizes the maximum error expressed in percent, which may be introduced into the test procedures by equipment or instrument limitations.

Measurement	% Max Error
Stack Temperature Ts	1.4
Meter Temperature Tm	1.0
Stack Gauge Pressure Ps	0.42
Meter Gauge Pressure Pm	0.42
Atmospheric Pressure Patm	0.21
Dry Molecular Weight Md	0.42
Moisture Content Bws (Absolute)	1.1
Differential Pressure Head ΔP	10.0
Orifice Pressure Differential ΔH	5.0
Pitot Tube Coefficient Cp	2.4
Orifice Meter Coefficient Km	1.5
Diameter of Probe Nozzle Dn	0.80

3.2.1 Manual Methods: QA procedures outlined in the test methods were followed, including equipment specifications and operation, calibrations, sample recovery and handling, calculations and performance tolerances.

On-site quality control procedures include pre- and post-test leak checks on the sampling system and pitot lines. If pre-test checks indicate problems, the system is fixed and rechecked before starting testing. If post-test leak checks are not acceptable, the test run is voided and the run is repeated. The results of the leak checks for the test runs are on the Field Data sheets.

Thermocouples used to measure the exhaust temperature are calibrated in the field using EPA Alternate Method 11. A single-point calibration on each thermocouple system using a reference thermometer is performed.

Thermocouples must agree within ±2°F with the reference thermometer. Also, prior to use, thermocouple systems are checked for ambient temperature before heaters are started or readings are taken. Nozzles are inspected for nicks or dents and pitots are examined before and after each use to confirm that they are still aligned. The results were within allowable tolerances. Pre- and post-test calibrations on the meter boxes are included with the report along with semi-annual calibrations of critical orifices, pitots, nozzles, and thermocouples (sample box impinger outlet and oven, meter box inlet and outlet, and thermocouple indicators).

3.2.2 Tedlar Bag Gas Sampling and Analysis: The QA procedures from EPA Method 3/3A in Title 40 CFR Part 60, Appendix A, July, 2007 were followed for gas sampling and analysis. Analyzer system checks are noted on the Calibration Field Record sheet, with procedures documented in the QA/QC section of the Appendix. All calibration standards used in the testing were EPA Protocol 1. Gas certificates are in the Appendix.

4. SOURCE DESCRIPTION AND OPERATION

4.1 Process and Control Device Description and Operation:

There are four glass-melting furnaces at the Saint-Gobain plant in Seattle, Washington. Furnace No. 5 is oxy-fuel fired, with oxygen gas being used to support fuel combustion rather than ambient air. This process results in greater overall energy efficiency, improved energy transfer to the glass, and a significant reduction in NO_x emissions. The primary fuel source of Furnace No. 5 is natural gas with additional energy input from electricity delivered through electrodes immersed in the glass (electric boosting). A cloud chamber scrubber was installed to reduce pollutant emissions at the outlet of the furnace. Furnace No. 5 total chrome testing was done at the Cloud Chamber inlet.

Production records including raw materials, glass produced and fuel usage data are included in the Appendix

4.2 Test Ports:

4.2.1 Test Duct Characteristics:
Construction: Steel
Shape: Circular
Size: 36 inches inside diameter
Orientation: Vertical
Flow straighteners: None
Extension: None
Cyclonic Flow: No Cyclonic flow expected
Meets EPA Method 1 Criteria: Yes

4.3 Operating Parameters: See Production/Process Data section of Appendix. Confidential batch composition information will not be included in the official report, but will be provided to PSCAA as a supplementary enclosure.

4.4 Process Startups/Shutdowns or Other Operational Changes During Tests: Process was continuous during testing.

5. SAMPLING AND ANALYTICAL PROCEDURES

5.1 Sampling Procedures:

5.1.1 Sampling and Analytical Methods: Testing was in accordance with procedures and methods listed in the Source Test Plan dated March 2, 2010 (see Correspondence Section in the Appendix), including the following: EPA Methods in 40 CFR Part 60, Appendix A, July 1, 2007.

Flow Rate:	EPA Methods 1 and 2 (S-type pitot traverses with EPA Method 29)
CO_2 and O_2:	EPA Method 3/3A (integrated bag samples with NDIR and paramagnetic analyzers)
Moisture:	EPA Method 4 (incorporated with EPA Method 29)
Metals:	EPA Method 29 (isokinetic impinger technique with analysis by ICP-OES/ICP-MS)

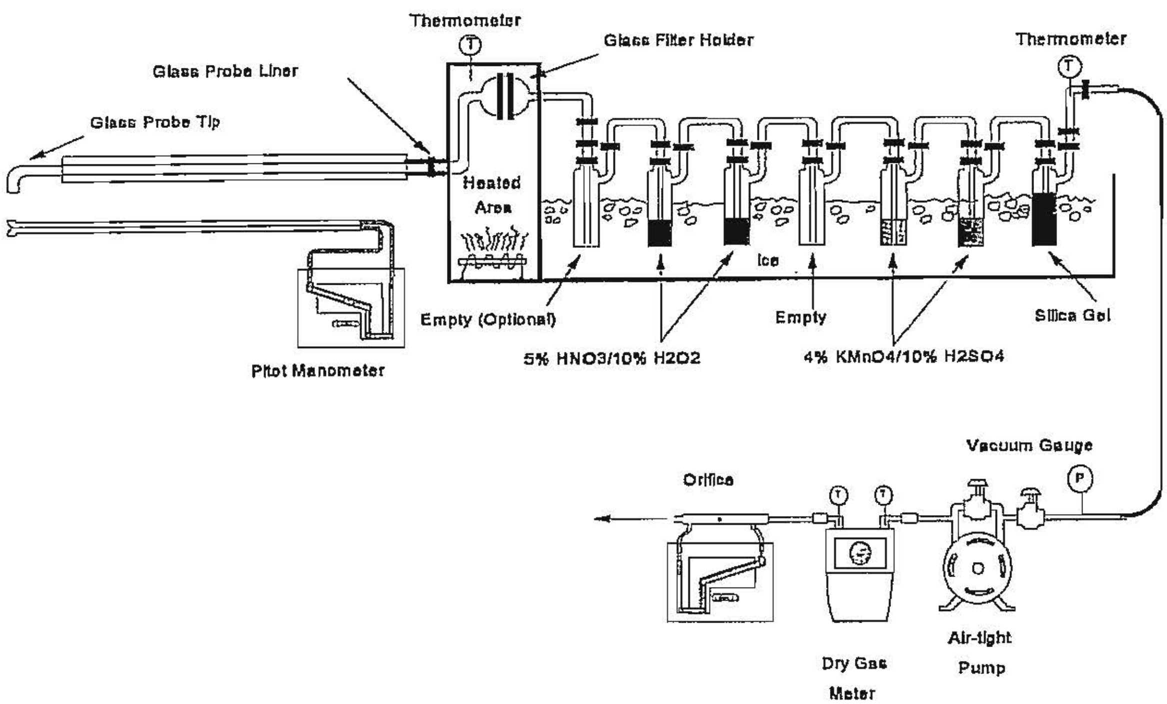
5.1.2 Sampling Notes: During the Run 1 sample recovery, the test team leader noticed that the filter was very clean and, because he was concerned about meeting the method detection limit, decided to test for 180 minutes during Runs 2 and 3. Engineer Gerry Pade of PSCAA approved this modification to the sampling time.

5.1.3 Laboratory Analysis:

Analyte	**Laboratory**
Chrome	Columbia Analytical Services, Kelso, WA

5.2 Sampling Train Diagram:

Figure 1
EPA Method 29 Chrome Sample Train Diagram



5.2.1 Diagram Exceptions: Impingers 4, 5 and 6 were not used (not necessary unless mercury is to be tested)

5.3 Horizon Test Equipment:

5.3.1 Manual Methods:

Equipment Name	Identification
Isokinetic Meter Box	CAE Express, Horizon No. 4
Inclined Liquid Manometer	Incorporated with meter box
Probe Liners	Borosilicate Glass
Pitots and Thermocouples	4-3, 4-7
Nozzles	Quartz: Q4 & Q5
Barometer	Test Van II

5.3.2 CEM Analyzers and Methods:

Gas	Brand	Model	Cal. Span	Measurement Method	Method
O_2	Servomex	1400	22.26%	Paramagnetic	3/3A
CO_2	Servomex	1400	12.38%	Chopperless NDIR	3/3A

5.3.3 Bag Sampling Setup:

Integrated Tedlar bag samples were taken from the orifice exhaust of the isokinetic meter boxes used for flow and moisture determinations. The bag contents were then analyzed using the instruments listed above.

6. DISCUSSION

The results of the testing should be valid in all respects. All quality assurance checks including leak checks, instrument checks, and calibrations, were within method-allowable tolerances.

APPENDIX

Abbreviations & Acronyms

Abbreviations and Acronyms Used in the Report

AAC	Atmospheric Analysis & Consulting, Inc.
ADL	Above Detection Limit
BAAQMD	Bay Area Air Quality Management District
BACT	Best Achievable Control Technology
BDL	Below Detection Limit
BHP	Boiler Horsepower
BIF	Boiler and Industrial Furnace
BLS	Black Liquor Solids
C	Carbon
C_3H_8	Propane
CAS	Columbia Analytical Laboratory
CEM	Continuous Emissions Monitor
CEMS	Continuous Emissions Monitoring System
CERMS	Continuous Emissions Rate Monitoring System
CET	Calibration Error Test
CFR	Code of Federal Regulations
CGA	Cylinder Gas Audit
CH_4	Methane
Cl_2	Chlorine
ClO_2	Chlorine Dioxide
CNCG	Concentrated Non-Condensable Gas
CO	Catalytic Oxidizer
CO_2	Carbon Dioxide
COC	Chain of Custody
CTM	Conditional Test Method
CTO	Catalytic Thermal Oxidizer
DNCG	Dilute Non-Condensable Gas
Dioxins	Polychlorinated Dibenzo-p-dioxins (PCDD's)
DLL	Detection Level Limited
dscf	Dry Standard Cubic Feet
EIT	Engineer in Training
EPA	Environmental Protection Agency
ESP	Electrostatic Precipitator
EU	Emission Unit
FID	Flame Ionization Detector
Furans	Polychlorinated Dibenzofurans (PCDF's)
GC	Gas Chromatography
gr/dscf	Grains Per Dry Standard Cubic Feet
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HCl	Hydrogen Chloride
HRSG	Heat Recovery Steam Generator
IDEQ	Idaho Department of Environmental Quality
lb/hr	Pounds Per Hour
LRAPA	Lane Regional Air Protection Agency
MACT	Maximum Achievable Control Technology
MDI	Methylene Diphyenyl Diisocyanate
MDL	Method Detection Limit
MEK	Methyl Ethyl Ketone
MeOH	Methanol
MMBtu	Million British Thermal Units
MRL	Method Reporting Limit
MS	Mass Spectrometry
MSF	Thousand Square Feet
NCASI	National Council for Air and Steam Improvement

Abbreviations and Acronyms Used in the Report

NCG	Non-condensable Gases
NCUAQMD	North Coast Unified Air Quality Management District
NDIR	Non-dispersive Infrared
NESHAP	National Emissions Standards for Hazardous Air Pollutai
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMVOC	Non-Methane Volatile Organic Compounds
NO_x	Nitrogen Oxides
NPD	Nitrogen Phosphorus Detector
O_2	Oxygen
ODEQ	Oregon Department of Environmental Quality
ORCAA	Olympic Region Clean Air Agency
PAHs	Polycyclic Aromatic Hydrocarbons
PCWP	Plywood and Composite Wood Products
PE	Professional Engineer
PM	Particulate Matter
ppbv	Parts Per Billion by Volume
ppmv	Parts Per Million by Volume
PS	Performance Specification
PSCAA	Puget Sound Clean Air Agency
PSEL	Plant Site Emission Limits
psi	pounds per square inch
PTE	Permanent Total Enclosure
PTM	Performance Test Method
QA/QC	Quality Assurance and Quality Control
QSTI	Qualified Source Testing Individual
RA	Relative Accuracy
RAA	Relative Accuracy Audit
RACT	Reasonably Available Control Technology
RATA	Relative Accuracy Test Audit
RM	Reference Method
RTO	Regenerative Thermal Oxidizer
SCD	Sulfur Chemiluminescent Detector
SCR	Selective Catalytic Reduction System
SO_2	Sulfur Dioxide
SOG	Stripper Off-Gas
SWCAA	Southwest Clean Air Agency
TAP	Toxic Air Pollutant
TCA	Thermal Conductivity Analyzer
TCD	Thermal Conductivity Detector
TGNMOC	Total Gaseous Non-Methane Organic Compounds
TGOC	Total Gaseous Organic Compounds
THC	Total Hydrocarbon
TIC	Tentatively Identified Compound
TO	Thermal Oxidizer
TO	Toxic Organic (as in EPA Method TO-15)
TPH	Tons Per Hour
TRS	Total Reduced Sulfur
TTE	Temporary Total Enclosure
VE	Visible Emissions
VOC	Volatile Organic Compounds
WC	Inches Water Column
WDOE	Washington Department of Ecology
WWTP	Waste Water Treatment Plant

Nomenclature

Nomenclature

Constants	Value	Units	Definition	Ref
Pstd(1)	29.92126	inHg	Standard Pressure	CRC
Pstd(2)	2116.22	lbf / ft^2		CRC
Tstd	527.67	°R	Standard Temperature	CRC
R	1545.33	ft lbf / lbmol °R	Ideal Gas Constant	CRC
MWatm	28.965	lbm / lbmole	Atmospheric (20.946 %O2, 0.033% CO2, Balance N2+Ar)	
MWc	12.011	lbm / lbmole	Carbon	CRC
MWco	28.010	lbm / lbmole	Carbon Monoxide	CRC
MWco2	44.010	lbm / lbmole	Carbon Dioxide	CRC
MWh2o	18.015	lbm / lbmole	Water	CRC
MWno2	46.006	lbm / lbmole	Nitrogen Dioxide	CRC
MWo2	31.999	lbm / lbmole	Oxygen	CRC
MWso2	64.063	lbm / lbmole	Sulfur Dioxide	CRC
MWn2+ar	28.154	lbm / lbmole (Balance with 98.82% N2 & 1.18% Ar)	Emission balance	
C1	385.3211	ft^3 / lbmol	Ideal Gas Constant @ Standard Conditions	
C2	816.5455	inHg in^2/ °R ft^3	Isokentics units correction constant	
Kp	5129.4	ft / min [(inHg lbm/mole) / (°R inH2O)] ^½	Pitot tube constant	Ref 2.5.1

Symbol	Units	Definition	Calculating Equation or Source of Data	EPA
As	in^2	Area, Stack		
An	in^2	Area, Nozzle		
Bws	%	Moisture, % Stack gas	[100 Vw(std) / [Vw(std)+Vm(std)]]	Eq. 5-3
C	ppmv-C	Carbon (General Reporting Basis for Organics)		
C1	ft3/lbmol	Gas Constant @ Standard Conditions	[R Tstd / Pstd(2)]	
C2	inHg in^2/ °R ft^2		[14,400 Pstd / Tstd]	
Cd	lbm-GAS / MMdscf	Mass of gas per unit volume	[Cgas MWgas / C1]	
cg	gr/dscf	Grain Loading, Actual	[15.432 mn / Vm(std) 1,000]	Eq. 5-6
cg @ X%CO2	gr/dscf	Grain Loading Corrected to X% Carbon Dioxide	[X% / CO2%]	
cg @ X%O2	gr/dscf	Grain Loading Corrected to X% Oxygen	[(20.946-X) / (20.946-O2)]	
Cgas	ppmv, %	Gas Concentration, (Corrected)		
Cgas @ X%CO2	ppmv	Gas Concentration Correction to X% Carbon Dioxide	[X% / CO2%]	
Cgas @ X%O2	ppmv	Gas Concentration Correction to X% Oxygen	[(20.946-X%) / (20.946-O2%)]	
Cgas	ppmv		Mgas (lbm/hr) * 1,000,000*385.3211/60*Qsd*mw	
CO	ppmv	Carbon Monoxide		
Co	ft	Outer Circumference of Circular Stack		
Ci	ft	Inner Circumference of Circular Stack		
CO2	%	Carbon Dioxide		
Cp		Pitot tube coefficient		
Ct	lb/hr	Particulate Mass Emissions	[60 cg Qsd/ 7,000]	
dH	in H2O	Pressure differential across orifice		
Dn	in	Diameter, Nozzle		
dp^½		Average square root of velocity pressure		
Ds	in	Diameter, Stack		
E	lb / MMBtu	Pollutant Emission Rate	Cgas Fd MWgas (20.946 / (20.946-O2)) / (1,000,000 C1)	
Fd	dscf / MMBtu	F Factor for Various Fuels		Table 19-1
I	%	Percent Isokinetic	[C2 Ts(abs) Vm(std) / (vs Ps mfg An Ø)]	Eq. 5-8*
Md	lbm / lbmole	Molecular weight, Dry Stack Gas	[(1-%O2-%CO2)(MWn2+ar)+(%O2 MWo2)+(%CO2 MWco2)]	Eq. 3-1*
mfg		Mole fraction of dry stack gas	[1-Bws/100]	
Mgas	lbm/hr	Gaseous Mass Emisisons	[60 Cgas(ppmv) MW Pstd(2) Qsd / 1,000,000 R Tstd]	
mn	mg	Particulate lab sample weight		
Ms	lbm / lbmole	Molecular weight, Wet Stack	[Md mfg +MWh2o (1-mfg)]	Eq. 2-5
MW	lbm / lbmole	Molecular Weight		
NO2	ppmv-NO2	Nitrogen Dioxide (General Reporting Basis for NOx)		
NOx	ppmv-NO2	Nitrogen Oxides (Reported as NO2)		
O2	%	Oxygen		
OPC	%	Opacity		
Pbar	in Hg	Pressure, Barometric		
Pg	in H2O	Pressure, Static Stack		
Po	in Hg	Pressure, Absolute across Orifice	[Pbar + dH / 13.5951]	
Ps	in Hg	Pressure, Absolute Stack	[Pbar + Pg / 13.5951]	Eq. 2-6*
Qa	acf/min	Volumetric Flowrate, Actual	[As vs / 144]	
Qsd	dscf/min	Volumetric Flowrate, Dry Standard	[Qa Tstd mfg Ps] / [Pstd(1) Ts(abs)]	Eq 2-10*
Rf	MMBtu/hr		1,000,000 Mgas (20.946-O2)] / [Cd Fd 20.946]	
SO2	ppmv-SO2	Sulfur Dioxide		
t	in	Wall thickness of a stack or duct		
TGOC	ppmv-C	Total Gaseous Organic Concentration (Reported as C)		
Tm	°F	Temperature, Dry gas meter		
Tm(abs)	°R	Temperature, Absolute Dry Meter	[Tm + 459.67]	
Ts	°F	Temperature, Stack gas		
Ts(abs)	°R	Temperature, Absolute Stack gas	[Ts + 459.67]	
Vlc	ml	Volume of condensed water		
Vm	dcf	Volume, Gas sample		
Vm(std)	dscf	Volume, Dry standard gas sample	[Y Vm Tstd Po] / [Pstd(1) Tm(abs)]	Eq. 5-1
vs	fpm	Velocity, Stack gas	Kp Cp dp^½ [Ts(abs) / (Ps Ms)]^ ½	Eq. 2-9*
Vw(std)	scf	Volume, Water Vapor	0.04707 Vlc	Eq. 5-2
Y		Dry gas meter calibration factor		Fig. 5.6
Ø	min	Time, Total sample		

* Based on equation.

Total Chrome

Total Chrome and Flow Rate Results

Example Calculations

Field Data

Sample Recovery Field Data and Worksheets

Laboratory Results and COC

Traverse Point Locations

Tedlar Bag Field Data and Analyzer Calibration Data

EPA Method 29 Chromium Results

Saint Gobain Containers						11-Mar-10
Furnace #5, CC Inlet						PS
Seattle, WA						MEW
Vm(std)	dscf	55.18	82.38	86.80	74.79	
	dscm	1.563	2.333	2.458	2.12	
Q(std)	dscf/min	9,326	9,147	8,853	9,109	
Time	min	120	180	180		
Oxygen	%	19.00	19.20	19.00	19.07	
Glass Production (ton/hr)		3.13	3.13	3.13	3.13	

	TOTAL				BACK HALF				FRONT HALF			
RESULTS	Run 1	Run 2	Run 3	Avg	Run 1	Run 2	Run 3	Avg	Run 1	Run 2	Run 3	Avg
Chromium ug	985.80	1523.50	1585.70	1365.00	13.80	3.50	5.70	7.67	972.00	1520.00	1580.00	1357.33
CONCENTRATIONS	Run 1	Run 2	Run 3		Run 1	Run 2	Run 3		Run 1	Run 2	Run 3	
Chromium ug/m3	630.853	653.088	645.160	643.034	8.831	1.500	2.319	4.217	622.022	651.588	642.841	638.817
MASS EMISSIONS	Run 1	Run 2	Run 3		Run 1	Run 2	Run 3		Run 1	Run 2	Run 3	
Chromium lbm/hr	2.20E-02	2.24E-02	2.14E-02	2.19E-02	3.08E-04	5.14E-05	7.69E-05	1.46E-04	2.17E-02	2.23E-02	2.13E-02	2.18E-02
PRODUCTION BASED	Run 1	Run 2	Run 3		Run 1	Run 2	Run 3		Run 1	Run 2	Run 3	
Chromium lbm/ton	7.03E-03	7.14E-03	6.83E-03	7.00E-03	9.85E-05	1.64E-05	2.45E-05	4.65E-05	6.93E-03	7.13E-03	6.80E-03	6.95E-03

Flow Rate and Moisture

Client	Saint Gobain Containers	3/11/10	Date
Source	Furnace #5, CC Inlet	PS	Operator
Location	Seattle, WA	3472	
	1,2,3,4,29	mew	Analysist/QA

Definitions	Symbol	Units	Run 1	Run 2	Run 3	Average
Time, Starting			8:25	10:50	14:10	
Time, Ending			10:28	13:57	17:16	
Volume, Gas sample	Vm	dcf	57.601	85.475	90.798	77.96
Temperature, Dry gas meter	Tm	°F	79.17	75.92	80.44	78.51
Temperature, Stack gas	Ts	°F	408.42	378.81	398.64	395.29
Pressure differential across orifice	dH	in H2O	0.693	0.668	0.763	0.71
Average square root velocity pressure	dp^½	in H2O^½	0.548	0.562	0.519	
Diameter, Nozzle	Dn	in	0.2648	0.2643	0.2648	
Pitot tube coefficient	Cp		0.8392	0.7871	0.8392	
Dry gas meter calibration factor	Y		0.98392	0.98392	0.98392	
Pressure, Barometric	Pbar	in Hg	29.70	29.70	29.70	
Pressure, Static Stack	Pg	in H2O	-2.2	-2.2	-2.2	
Time, Total sample	Ø	min	120	180	180	160
Stack Area	As	in^2	1017.9	1017.9	1017.9	
Nozzle Area	An	in^2	0.0551	0.0549	0.0551	
Volume of condensed water	Vlc	ml	104.4	154.5	173.5	144.12
Oxygen		% O2	19.00	19.20	19.00	19.07
Carbon Dioxide		% CO2	3.60	3.00	3.80	3.47
Molecular weight, Dry Stack	Md	lbm / lbmole	29.46	29.37	29.49	29.44
Pressure, Absolute Stack	Ps	in Hg	29.54	29.54	29.54	29.54
Pressure, avg arcoss orifice	Po	in Hg	29.75	29.75	29.76	29.75
Volume, Dry standard gas sample	Vm(std)	dscf	55.18	82.38	86.80	74.79
Volume, Water Vapor	Vw(std)	scf	4.91	7.27	8.17	6.78
Moisture, % Stack (EPA 4)	Bws(1)	%	8.18	8.11	8.60	8.30
Moisture, % Stack (Psychrometry-Sat)	Bws(2)	%	na	na	na	
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	
Moisture, % Stack (Psychrometry)	Bws(4)	%	na	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	na	na	na	
Mole Fraction dry Gas	mfg		91.8%	91.9%	91.4%	91.7%
Molecular weight, Wet Stack	Ms	lbm / lbmole	28.52	28.45	28.50	28.49
Velocity, Stack gas	vs	fpm	2,394	2,267	2,258	2,306
Volumetric Flowrate, Actual	Qa	acf/min	16,924	16,023	15,960	16,303
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	9,326	9,147	8,853	9,109
Percent Isokinetic	I	%	91.1	92.8	100.6	94.9

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Example Calculations
Metals Emissions

Client: Saint Gobain Source Furnace No.5 - Clad/Chamber Inlet

Date 03/11/2010 Project # 3472 Run # 2

Metals Emissions – Mass Rate

Metal Cr measured 1523.5 µg

Sample Volume 82.38 dscf Flow Rate 9,147 dscf/min

Equation:

$$lb - \underline{Cr} / hr = \frac{measured\mu g * mg / 1000\mu g}{SampleVolume} * FlowRate * \frac{60\min}{hr} * \frac{lb}{453592.37mg}$$

Calculation:

$$\frac{1523.5\ \mu g * mg / 1000\mu g}{82.38\ dscf} * \frac{9,147\ dscf}{\min} * \frac{60\min}{hr} * \frac{lb}{453592.37mg} = \underline{0.0224}\ \mathbf{lb\text{-}\underline{Cr}/hr}$$

Client: Saint Gobain Source Furnace No. 5- Cloud Chamber Inlet
Date 3/11/2010 Project # 3472 Run # 2 Page 2

CHROMIUM CONCENTRATION. mg/dscm

Measured Results, gr/dscf 0.0002854

Equation: $$CR, mg/dscm = Cr, gr/dscf \times \frac{lb}{7000gr} \times \frac{453{,}592mg}{lb} \times \frac{35.315cubicft}{cubicMeter}$$

Calculation: $$0.0002854\ Cr, gr/dscf \times \frac{lb}{7000gr} \times \frac{453{,}592mg}{lb} \times \frac{35.315cubicft}{cubicMeter}$$

$$= 0.6531\ Cr, mg/dscm$$

$$= \boxed{653.1\ \mu g\text{-}Cr/dscm}$$

Sample Calculations, Additional Concentrations & Rates

Client: Saint Gobain Source Furnace No. 5 - Cloud Chamber Inle
Date 3/11/2010 Project # 3472 Run # 2

Chromium Emissions Production Based: lb/ton glass production:

Measured Cr Results, lb/hr 0.0224

Glass Production (Pull Rate), tons/day 75.2

Equation: $$\frac{lbCr}{tonGlass} = \left(\frac{lbCr}{hr}\right) \times \left(\frac{day}{tonsGlass}\right) \times \left(\frac{24hr}{day}\right)$$

Calculation: $$\left(\frac{0.0224\ lbCr}{hr}\right) \times \left(\frac{day}{75.2\ tonsGlass}\right) \times \left(\frac{24hr}{day}\right) = \frac{0.00715\ lbCr}{tonGlass}$$

Client: Saint Gobain Date 3/11/2010

Source Furnace 5-Clad Chamber Inlet Project # 3472 Run # 2

Molecular Weights (lb/lbmol):

CO_2=44.01	O_2=31.999	N_2+Ar=28.154	H_2O=18.015	atm=28.965

Constants:

Pstd(1)=29.92129 in Hg	Tstd=527.67 °R	Kp=5129.4	C2=816.5455inHg in^2/°R ft^2

Pressure, Absolute Stack (Ps):

$$Ps, inHg = P_{Barometric} + \frac{P_{static}}{13.6} = 29.70\ inHg + \frac{-2.2\ in\ H2O}{13.6} = 29.54\ inHg$$

Volume, Dry Standard Gas Sample (Vm[std]): $Tm = 75.9 \circ F + 459.7 = 535.6 \circ R$

$$Orifice\ Press = Pb\ 29.70\ inHg + \frac{0.668\ \Delta H}{13.6} = 29.75\ inHg$$

$$Vm(std)\,ft^3 = \frac{Y \times MeterVol \times Tstd \times Orifice\ Pres(Po)}{Pstd(1) \times Tm \circ R}$$

$$= \frac{.98392 \times 85.475\ ft^3 \times 527.67 \circ R \times (Po\ 29.75\ inHg)}{29.9213 inHg \times 535.6 \circ R} = 82.38\ dscf$$

Moisture, % Stack Gas (bws): $V_{wstd} = 0.04707 \times Cond.H2O, ml = 0.04707 \times 154.5 ml = 7.27 scf$

$$bws = 100 \times \frac{V_{wstd}}{V_{wstd} + V_{mstd}} = \frac{7.27\ scf}{7.27\ scf + 82.38\ dscf} = 8.11\ \%$$

Mole Fraction Gas (mfg): $1 - \frac{bws}{100} = 1 - \frac{8.11\ \%}{100} = 0.9189$

Molecular Weight, Dry, Stack (Md):

$$Md \frac{lb}{lbmol} = \left[(1 - \frac{O_2}{100} - \frac{CO_2}{100}) \times MolWtN2Ar\right] + \left[\frac{O_2}{100} \times MolWtO2\right] + \left[\frac{CO_2}{100} \times MolWtCO2\right]$$

$$= \left[(1 - \frac{19.2\ \%O_2}{100} - \frac{3.0\ \%CO_2}{100}) \times 28.154 \frac{lb}{lbmol}\right] + \left[\frac{19.2\ \%O_2}{100} \times 31.999 \frac{lb}{lbmol}\right] +$$

$$\left[\frac{3.0\ \%CO_2}{100} \times 44.010 \frac{lb}{lbmol}\right]$$

$$= 29.37 \frac{lb}{lbmol}$$

Client: St. Gobain Date 3/11/2010

Molecular Weight, Wet, Stack (Ms):

$$Ms\frac{lb}{lbmol} = (Md \times mfg) + (MolWtH_2O \times (1 - mfg)) = \left(\underline{29.37}\frac{lb}{lbmol} \times \underline{.9189}\right) + (18.015 \times (1 - \underline{.9189}))$$

$$= \underline{28.45}\ \frac{lb}{lbmol}$$

Stack gas (vs): $Ts = \underline{378.8} \circ F + 459.7 = \underline{838.5} \circ R$

$$= vs\frac{feet}{\min} = Kp \times Cp \times dp\sqrt{inH_2O} \times \sqrt{\frac{Ts \circ R}{Ps \times Ms}}$$

$$= 5129.4\,ft/\min \ldots \times \underline{.7871} \times \underline{.562}\,dp\sqrt{inH_2O} \times \sqrt{\frac{\underline{838.5} \circ R}{\underline{29.54}\,inHg \times \underline{28.45}\,\frac{lb}{lbmol}}} = \underline{2266.4}\frac{ft}{\min}$$

Flow Rate, Actual (Qa):

$$Qa\frac{actualCubicFeet}{\min} = \frac{AreaStack \times vs}{144} = \frac{\underline{1017.9}\,in^2 \times \underline{2266.4}\,\frac{ft}{\min}}{144} = \underline{16,021}\ acfm$$

Flow Rate, Dry Standard (Qsd):

$$Qsd\frac{dryStdFt^3}{\min} = \frac{Qa \times Tstd \times mfg \times Ps}{Pstd(1) \times Ts \circ R} = \frac{\underline{16,021}\ acfm \times 527.67 \circ R \times \underline{0.9189} \times \underline{29.54}\ inHg}{29.9213\,inHg \times \underline{838.5} \circ R}$$

$$= \underline{9,146}\ \frac{dscf}{\min}$$

Percent Isokinetic:

$$I\% = \frac{C_2 \times T_s\,°R \times V_m(std)}{Vs \times P_s \times mfg \times A_n \times \theta}$$

$$= \frac{816.5455\ inHg \cdot in^2/°R \cdot ft^2 \times 838.5\,°R \times 82.38\,dscf}{2266.4\ ft/min \times 29.54\ inHg \times 0.9189 \times 0.0549\,in^2 \times 180\,min}$$

$$= \boxed{92.78\%}$$

Field Data Sheet

HORIZON ENGINEERING LLC

13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Scott Galvanizing
Plant: Seattle, WA
Location: F5
Sample Location: inlet

Date 3/11/10
Test Method
Concurrent Testing —
Run # 1
Operator NY Support PS
Temperature, Ambient (Ta) 45
Moisture 17% Tdb – Twb –
Press., Static (Pstat) -2.2 Press., Bar (Pb) 29.7
Cyclonic Flow Expected ? NO If yes, avg. null angle – degrees

Stack Diagram
ALT-011
Std TC (ID/°F) 53
Stack TC (ID/°F) 53
Continuity Check ↑ or ↓

Probe 4-3 (g / s) Cp .8392 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0@4 Post @
Lo 0@4 @
Nozzle .2648 Q4 Oven 186 Imp. Outlet 1-10
Filter Heat Set 250 °F
Meter Box 4 dH@ 1.65610 Y .98392
Meter Leak Check Pretest: 0.006 cfm 13 inHg
Post: 0.002 cfm 10 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		8:25	747.415				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	5		750.30	.45	.969	.97	417	241	240	47	69	66	3
2	10		753.14	.45	.969	.97	417	243	240	49	69	67	3
3	15		756.–	.43	.933	.93	416	242	241	48	72	67	3
4	20		758.54	.37	.807	.81	412	243	241	49	74	68	3
5	25		760.98	.32	.703	.70	410	243	241	51	76	69	3
6	30		763.32	.28	.619	.62	410	242	240	52	78	70	3
7	35		765.42	.22	.486	.49	410	249	245	52	80	71	3
8	40		767.46	.22	.486	.49	408	247	245	54	82	73	3
9	45		769.94	.32	.707	.71	412	246	244	55	83	74	3
10	50		772.36	.30	.687	.69	386	249	245	52	85	75	3
11	55		774.79	.30	.669	.67	408	244	244	52	85	75	3
12	100	925/928	777.180	.30	.669	.67	408	245	247	52	85	75	3
13	65		780.19	.51	1.12	1.1	423	245	245	54	83	77	3
14	70		783.–	.48	1.06	1.1	423	246	245	54	86	78	3
15	75		786.19	.46	1.02	1.0	423	248	245	55	88	78	4
16	80		789.07	.43	.957	.96	420	249	245	60	89	79	4
17	85		791.87	.40	.890	.89	418	247	244	52	90	79	4
18	90		794.35	.31	.698	.70	410	249	245	51	90	80	4
19	95		796.28	.18	.405	.41	406	246	243	48	90	80	3
20	100		797.94	.14	.320	.32	396	247	240	49	89	80	3
21	105		799.76	.16	.366	.37	394	247	244	50	89	81	3
22	110		801.54	.16	.366	.37	393	245	244	50	88	81	3
23	115		803.27	.15	.343	.34	390	244	244	50	88	81	3
24	120	10:28	805.016	.15	.343	.34	392	244	244	51	87	81	3
25													

Notes:
Nozzle cals .2650 .2645 .2650 ⟩ .2648

Field Data Sheet

13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

HORIZON ENGINEERING

1 of 2

Client: Saint Gobain
Plant: Seattle, WA
Location: F5
Sample Location: Inlet

Date 3/11/10
Test Method
Concurrent Testing —
Run # 2
Operator NY Support PS
Temperature, Ambient (Ta) 45
Moisture 17% Tdb — Twb —
Press., Static (Pstat) -2.2 Press., Bar (Pb) 29.7
Cyclonic Flow Expected? No If yes, avg. null angle — degrees

Stack Diagram
ALT-011
Std TC (ID/°F) ______
Stack TC (ID/°F) ______
Continuity Check ↑ or ↓

Probe 4-7 (g / s) Cp .7871 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0@4 Lo 0@4 Post @ @
Nozzle .2643 (.25) Oven 189 Imp. Outlet 1-4
Filter Heat Set 250 °F
Meter Box 4 dH@ 1.65610 Y .98392
Meter Leak Check Pretest: 0.004 cfm 13 inHg Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		10:50	805.410				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	5		808.15	.44	.869	.87	396	244	245	49	81	78	3
2	10		810.81	.42	.829	.83	395	246	244	48	78	77	3
3	15		813.45	.42	.829	.83	393	242	246	45	79	78	3
4	20		815.80	.33	.652	.65	391	242	245	46	79	76	3
5	25		818.—	.33	.652	.65	390	242	246	46	79	75	3
6	30		820.31	.24	.476	.48	391	242	246	46	80	75	3
7	35		822.27	.22	.439	.44	386	241	246	46	80	75	3
8	40		824.34	.25	.499	.50	386	241	247	47	80	74	3
9	45		826.—	.32	.638	.64	381	248	246	44	80	74	3
10	50		829.10	.34	.678	.68	378	249	245	45	80	74	4
11	55		831.44	.31	.646	.65	350	248	247	45	80	73	4
12	60	1150/1153	833.809	.31	.646	.65	357	248	246	45	80	74	4
13	65		836.77	.51	1.00	1.0	395	250	246	45	76	72	5
14	70		839.68	.51	.999	1.0	399	250	246	46	79	74	5
15	75		842.55	.49	.957	.96	402	242	246	43	80	73	5
16	80		845.36	.47	.917	.92	401	242	246	42	80	73	5
17	85		848.00	.41	.805	.81	396	242	246	42	80	72	5
18	90		850.—	.31	.612	.61	391	243	247	41	80	72	5
19	95		852.12	.18	.356	.36	386	243	246	41	80	72	3
20	100		853.83	.18	.358	.36	384	244	246	42	80	72	3
21	105		855.56	.18	.358	.36	368	244	245	42	79	72	3
22	110		857.37	.18	.383	.38	330	243	246	42	78	72	3
23	115		859.16	.15	.320	.32	328	242	245	42	78	72	3
24	120	1253	860.807	.15	.320	.32	326	242	245	42	78	72	3
25													

Notes:
Nozzle .2645 .2645 } .2643

Field Data Sheet

HORIZON ENGINEERING LLC
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

2 of 2

Client: [illegible]
Plant: seattle, WA
Location: F5
Sample Location: inlet

Date 3/11/10
Test Method
Concurrent Testing —
Run # 2
Operator NY Support PS
Temperature, Ambient (Ta) 45
Moisture 17% Tdb — Twb —
Press., Static (Pstat) -2.7 Press., Bar (Pb) 29.7
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Stack Diagram
ALT-011
Std TC (ID/°F) ____
Stack TC (ID/°F) ____
Continuity Check ↑ or ↓

Probe 4-7 (g / s) Cp ,7871 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0@4 Post 0@4; Lo 0@4 0@4
Nozzle ,2643 Q5 Oven 189 Imp. Outlet / -4
Filter Heat Set 250 °F
Meter Box 4 dH@ 1,65610 Y ,98592
Meter Leak Check Pretest: 0.004 cfm 13 inHg; Post: 0.006 cfm 12 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	Pump Vacuum inHg (Pv)
		12:57	860.807										
1	125		863.56	.47	.914	.91	400	248	245	45	74	71	6
2	130		866.33	.47	.914	.91	397	240	245	46	77	71	6
3	135		869.05	,44	,855	,86	396	246	246	47	78	71	6
4	140		871.54	,37	,725	.73	393	248	246	45	79	72	6
5	145		873.78	,30	,592	.59	387	247	246	45	79	71	5
6	150		875.84	,26	,513	.51	384	247	245	46	78	71	5
1	155		878.05	,23	,546	,55	384	245	255	46	78	71	5
2	160		880.25	,23	,546	,55	384	245	246	47	78	71	5
3	165		882.86	,32	,768	.77	382	241	245	48	79	72	5
4	170		885.52	,32	,768	.77	374	245	246	47	79	71	6
5	175		888.20	,32	,819	.82	330	243	245	47	79	71	6
6	180	13:57	890.885	,32	,819	.82	326	240	245	47	79	71	6

Notes: changed moisture to 9% at 150 mins.

Field Data Sheet

HORIZON ENGINEERING	13585 NE Whitaker Way Portland, OR 97230 Phone (503) 255-5050 Fax (503) 255-0505	1 of 2	Client: Saint Gobain Plant: Seattle, WA Location: F5 Sample Location: Inlet

Date 3/11/10

Test Method

Concurrent Testing —

Run # 3

Operator NY Support PS

Temperature, Ambient (Ta) 45

Moisture 9% Tdb — Twb —

Press., Static (Pstat) -2.2 Press., Bar (Pb) 29.7

Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Stack Diagram

ALT-011

Std TC (ID/°F) ______

Stack TC (ID/°F) ______

Continuity Check ↑ or ↓

Probe 4-3 (g/s) Cp .8392 Heat Set 250 °F

Post-Test Pitot Inspection (NC=no change, D=damaged)

Pitot Lk Rate in H2O@in H2O Pre: Hi 0@5 Post @ Lo 0@3 @

Nozzle .2648 D4 Oven 186 Imp. Outlet 1-10

Filter Heat Set 250 °F

Meter Box 4 dH@ 1.65610 Y .98392

Meter Leak Check Pretest: 0.004 cfm 10 inHg Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		14:10	891.137				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	5		894.17	.40	1.07	1.1	402	257	241	49	73	70	3
2	10		897.19	.40	1.07	1.1	402	258	241	48	75	71	3
3	15		900.08	.37	.994	.99	397	257	243	47	77	72	3
4	20		902.92	.34	.913	.91	395	257	244	47	78	71	3
5	25		905.42	.28	.752	.75	392	258	245	47	79	71	3
6	30		907.66	.21	.572	.57	390	258	244	48	80	72	3
7	35		909.71	.18	.490	.49	388	257	245	46	80	72	3
8	40		911.93	.21	.572	.57	390	258	245	46	80	72	3
9	45		914.45	.28	.758	.76	395	258	245	47	81	72	3
10	50		917.—	.28	.758	.76	394	257	245	45	80	73	3
11	55		919.54	.28	.758	.76	399	256	245	46	82	74	3
12	60	15:10 15:13	922.100	.28	.758	.76	402	255	245	47	82	74	3
13	65		925.30	.46	1.23	1.2	410	256	246	49	82	75	4
14	70		928.44	.46	1.23	1.2	411	260	246	48	84	76	4
15	75		931.59	.43	1.15	1.2	410	257	244	47	85	76	4
16	80		934.67	.40	1.07	1.1	409	260	246	47	85	76	4
17	85		937.57	.36	.965	.97	406	260	246	47	86	77	4
18	90		940.14	.27	.735	.74	401	258	245	48	87	77	4
19	95		941.89	.12	.330	.33	393	257	245	49	88	79	3
20	100		943.60	.12	.330	.33	389	258	245	49	86	78	3
21	105		945.49	.14	.387	.39	390	256	244	49	85	79	3
22	110		947.40	.14	.391	.39	379	255	245	49	86	79	3
23	115		949.—	.12	.335	.34	380	256	245	50	87	80	3
24	120	16:13	950.831	.12	.335	.34	385	256	245	50	86	79	3
25													

Notes:

Field Data Sheet

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

2 of 2

Client: Saint Gobain
Plant: Seattle, WA
Location: F5
Sample Location: Inlet

Date 3/11/10
Test Method
Concurrent Testing –
Run # 3
Operator NY Support PS
Temperature, Ambient (Ta) 45
Moisture 9% Tdb – Twb –
Press., Static (Pstat) -2.2 Press., Bar (Pb) 29.7
Cyclonic Flow Expected? NO If yes, avg. null angle – degrees

Stack Diagram
ALT-011
Std TC (ID/°F)
Stack TC (ID/°F)
Continuity Check ↑ or ↓

Probe 4-3 (g / s) Cp .8392 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 5 Post 0 @ 4; Lo 0 @ 3 0 @ 5
Nozzle .2648 Q4 Oven 186 Imp. Outlet 1-10
Filter Heat Set 250 °F
Meter Box 4 dH@ 1.65610 Y .98392
Meter Leak Check Pretest: .004 cfm 10 inHg; Post: .003 cfm 10 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		16:16	950.831				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	125		953.92	.43	1.16	1.2	405	257	244	50	83	79	5
2	130		957.08	.41	1.11	1.1	407	258	245	50	87	80	5
3	135		960.11	.39	1.06	1.1	408	258	245	51	88	80	5
4	140		962.–	.31	.839	.84	410	258	245	52	90	80	5
5	145		965.30	.26	.703	.70	408	260	246	54	90	80	4
6	150		967.46	.20	.546	.55	402	258	245	52	91	81	4
7	155		969.47	.16	.437	.44	397	258	245	50	89	81	3
8	160		971.71	.20	.546	.55	397	257	244	51	88	80	3
9	165		974.–	.27	.737	.74	402	258	245	52	88	80	3
10	170		976.85	.27	.737	.74	395	255	243	51	88	81	4
11	175		979.41	.27	.733	.73	407	256	245	51	88	81	4
12	180	17:16	981.935	.27	.733	.73	406	256	244	51	89	81	4
13													
14													
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24													
25													

Notes:

Sample Recovery / Moisture Catch

Saint Gobain Containers — 3/11/2010
Furnace #5, CC Inlet — PS
Seattle, WA — 3472
mew

Definitions	Symbol	Units	Run 1					Run 2					Run 3				
Impinger Contents			3	4	5A	5B	5C	3	4	5A	5B	5C	3	4	5A	5B	5C
	Rinse #2	g															
	Impinger, Contents,Condensate & Rinse#1	g	123.00	480.00				123.00	525.00				119.00	548.00			
spg	Impinger, Contents & Condensate	g	25.00	381.00				26.00	428.00				20.00	448.00			
g/ml	Impinger	g	25.00	74.00				26.00	75.00				20.00	75.00			
1.0590	10% H2O2 / 5% HNO3	ml		200.00					200.00					200.00			
1.1515	4% KMnO4 / 10% H2SO4	ml		0.00					0.00					0.00			
1.0016	0.1 N HNO3	ml		0.00					0.00					0.00			
0.9982	H2O	ml		0.00					0.00					0.00			
1.0878	8N HCL / H2O	ml		0.00					0.00					0.00			
	Condensate	g		95.20					141.20					161.20			
	Rinse	g	98.00	100.00				97.00	97.00				99.00	100.00			
	0.1 N HNO3	gm	98.00	99.00				97.00	97.00				99.00	100.00			
		ml	97.84	98.84				96.84	96.84				98.84	99.84			
Rinse + Initial	10% KMnO4	gm															
		ml															
	10% H2O2 / 5% HNO3	gm															
		ml		200.00					200.00					200.00			
	8N HCL / H2O	gm															
		ml															
Silica Gel Impinger	Final weight	g		529.00					633.00					532.00			
	Initial weight	g		520.00					620.00					520.00			
	Gain	g		9.00					13.00					12.00			
Total Moisture Gain	Condensate + Silica Gel gain	g		104.20					154.20					173.20			
Vlc	Net Moisture Gain	ml		104.39					154.47					173.51			

HORIZON ENGINEERING LLC
13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 255-5050 • Fax (503) 255-0505
www.horizonengineering.com

Sample Recovery Worksheet – EPA Method 29 Multi-Metals

Client: St. Gobain Seattle, WA Source: Furnace #5 C.C. Inlet

Run No.: 1 Test Date: 20100311

Container No.	Empty Container (grams)	Impinger Contents (grams)	Impinger Contents w/ Rinse (grams)	Additional Impinger Contents with Rinse (grams)
#1 Filter				
#3 Probe Rinse, HNO_3	25		123	
#4 HNO_3 or HNO_3/H_2O_2	74	381	480	
#5A, 0.1 N HNO_3	—	—	—	
# 5B $KMNO_4/H_2SO_4/H_2O$	—	—	—	—
#5C 8N HCl / H_2O	—		—	
#6 Silica Gel	520	529		

Run No.: 2 Test Date: 2010 0311

Container No.	Empty Container (grams)	Impinger Contents (grams)	Impinger Contents w/ Rinse (grams)	Additional Impinger Contents with Rinse (grams)
#1 Filter				
#3 Probe Rinse, HNO_3	26		123	
#4 HNO_3 or HNO_3/H_2O_2	75	428	525	
#5A, 0.1 N HNO_3	—	—	—	—
# 5B $KMNO_4/H_2SO_4/H_2O$	—	—	—	—
#5C 8N HCl / H_2O	—		—	—
#6 Silica Gel	620	633		

Run No.: 3 Test Date: 20100311

Container No.	Empty Container (grams)	Impinger Contents (grams)	Impinger Contents w/ Rinse (grams)	Additional Impinger Contents with Rinse (grams)
#1 Filter				
#3 Probe Rinse, HNO_3	20		119	
#4 HNO_3 or HNO_3/H_2O_2	75	448	548	
#5A, 0.1 N HNO_3				
# 5B $KMNO_4/H_2SO_4/H_2O$				
#5C 8N HCl / H_2O				
#6 Silica Gel	520	532		

Columbia Analytical Services™

1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

April 8, 2010 Analytical Report for Service Request No: K1002411

Margery Heffernan
Horizon Engineering, LLC
13585 NE Whitaker Way
Portland, OR 97230

RE: St. Gobain F5 Inlet/3472

Dear Margery:

Enclosed are the results of the samples submitted to our laboratory on March 15, 2010. For your reference, these analyses have been assigned our service request number K1002411.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3316. You may also contact me via Email at JChristian@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Jeff Christian
Laboratory Director

JC/rh

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- `*` The result is an outlier. See case narrative.
- `#` The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value that was detected outside the quantitation range.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.1 definition: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Metals Data Qualifiers

- `#` The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value that was detected outside the quantitation range.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.1 definition: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- `+` The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- `*` The result is an outlier. See case narrative.
- `#` The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value that was detected outside the quantitation range.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
  DOD-QSM 4.1 definition: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

Columbia Analytical Services

CHAIN OF CUSTODY

SR#: K1002411

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 2 COC #

PROJECT NAME: St. Gobain F5 Inlet
PROJECT NUMBER: 3472
PROJECT MANAGER: Preston Skaggs
COMPANY/ADDRESS: Horizon Engineering, 13585 NE Whitaker Way
CITY/STATE/ZIP: Portland OR 97230
E-MAIL ADDRESS: pskaggs@horizonengineering.com
PHONE #: 503-255-5050 FAX #:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 8270 8270LL	Volatile Organics 624 8260	Hydrocarbons (*see below) Gas Diesel Oil 8021 BTEX	Fuel Fingerprint (FIQ) NW-HCID Screen	Oil & Grease/TRPH 1664 HEM 1664 SGT	PCB's Aroclors Congeners	Pesticides/Herbicides 608 8081A 8141A 8151A	Chlorophenolics - 8151M Tri Tetra PCP	PAHS 8310 SIM	Metals, Total or Dissolved (See list below)	Cyanide Hex-Chrom	pH, Cond, Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020 AOX 1650 506				REMARKS
Run 1 Filter	3/11/10			Aqu	1										X								
Run 2 Filter	3/11/10				1										X								
Run 3 Filter	3/11/10				1										X								
Filter Blanks	3/11/10				1										X								
Run 1 Front Rinse	3/11/10				1										X								
Run 2 Front Rinse	3/11/10				1										X								
Run 3 Front Rinse	3/11/10				1										X								
Run 1 Impinger+Rinse	3/11/10				1										X								
Run 2 Imp.+Rinse	3/11/10				1										X								
Run 3 Imp.+Rinse	3/11/10			↓	1										X								

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

✓ II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # 3472

Bill To: Emily Bigwell

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

___ 5 Day

X Standard (10-15 working days)

___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed.

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

~~Audit Sample sent directly from PSCAA. Please include with results.~~

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 3/15/10 945	Signature: [signature] Date/Time: 3.15.10 9:45	Signature: [signature] Date/Time: 3.15.10 12:40	Signature: [signature] Date/Time: 3/15/10 12:40
Printed Name: Max Heffernan Firm: Horizon	Printed Name: [signature] Firm: CAS	Printed Name: [signature] Firm: CAS	Printed Name: Les Kennedy Firm: CAS

Columbia Analytical Services

CHAIN OF CUSTODY

SR#: K1003411

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PAGE 2 OF 2 COC #

PROJECT NAME: St. Gobain FS Inlet
PROJECT NUMBER: 3472
PROJECT MANAGER: Preston Skaggs
COMPANY/ADDRESS: Horizon Engineering, 13585 NE Whitaker Way
CITY/STATE/ZIP: Portland, OR 97230
E-MAIL ADDRESS: pskaggs@horizonengineering.com
PHONE #: 503-255-5050 FAX #
SAMPLER'S SIGNATURE:

Analysis columns: NUMBER OF CONTAINERS; Semivolatile Organics by GC/MS 625 8270 8270LL; Volatile Organics 624 8260 8021 BTEX; Hydrocarbons (*see below) Gas Diesel Oil; Fuel Fingerprint (FIQ) NW-HCID Screen; Oil & Grease/TRPH 1664 HEM 1664 SGT; PCB's Aroclors Congeners; Pesticides/Herbicides 608 8081A 8141A 8151A; Chlorophenolics - 8151M Tri Tetra PCP; PAHS 8310 SIM; Metals, Total or Dissolved (See list below); Cyanide; pH, Cond, Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle) Hex-Chrom; NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3; TOX 9020 AOX 1650 506; REMARKS

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Metals, Total or Dissolved	REMARKS
0.1N HNO_3 Blank	3/11/10			Aqu	1	X	
5% HNO_3 / 10% H_2O_2	3/11/10			↓	1	X	

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
X II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # 3472
Bill To: Emily Bagwell

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 3/15/10 945	Signature: [signature] Date/Time: 3-15-09 9:45	Signature: [signature] Date/Time: 3-15-10 12:40	Signature: [signature] Date/Time: 3/15/10 1240
Printed Name: Mark Heffernan Firm: Horizon	Printed Name: D. Wyatt Firm: CAS	Printed Name: D. Wyatt Firm: CAS	Printed Name: Les Kennedy Firm: CAS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	03/11/10
Sample Matrix:	Misc.	**Date Received:**	03/15/10
		Date Extracted:	03/30/10

Total Metals
Units: Micrograms (µg)
(Field Blank Corrected)

	Sample Name:		**Front Half Run - 1 (Analytical Fraction 1A)**		**Back Half Run - 1 (Analytical Fraction 2A)**		**Total Front Half + Back Half**
	Lab Code:		K1002411-001,-005		K1002411-008		-
	Date Analyzed:		04/02/10		04/02/10		-
Analyte	**EPA Method**	**Front Half MRL**		**Back Half MRL**		**Total MRL**	
Chromium	29/200.8	1.0	972	0.1	13.8	1.1	986

K1002411ICP.jc2 - Run 1 04/07/10

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	03/11/10
Sample Matrix:	Misc.	**Date Received:**	03/15/10
		Date Extracted:	03/30/10

Total Metals
Units: Micrograms (µg)
(Field Blank Corrected)

	Sample Name:		**Front Half Run - 2 (Analytical Fraction 1A)**		**Back Half Run - 2 (Analytical Fraction 2A)**		**Total Front Half + Back Half**
	Lab Code:		K1002411-002,-006		K1002411-009		-
	Date Analyzed:		04/02/10		04/02/10		-
Analyte	**EPA Method**	**Front Half MRL**		**Back Half MRL**		**Total MRL**	
Chromium	29/200.8	1.0	1520	0.1	3.5	1.1	1520

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Horizon Engineering, LLC		**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472		**Date Collected:**	03/11/10
Sample Matrix:	Misc.		**Date Received:**	03/15/10
			Date Extracted:	03/30/10

Total Metals
Units: Micrograms (µg)
(Field Blank Corrected)

		Sample Name:	**Front Half Run - 3 (Analytical Fraction 1A)**		**Back Half Run - 3 (Analytical Fraction 2A)**		**Total Front Half + Back Half**
		Lab Code:	K1002411-003,-007		K1002411-010		-
		Date Analyzed:	04/02/10		04/02/10		-
Analyte	**EPA Method**	**Front Half MRL**		**Back Half MRL**		**Total MRL**	
Chromium	29/200.8	1.0	1580	0.1	5.7	1.1	1590

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	03/11/10
Sample Matrix:	Misc.	**Date Received:**	03/15/10
		Date Extracted:	03/30/10

Total Metals
Units: Micrograms (µg)

	Sample Name:		**Front Half Blank** (Analytical Fraction 1A)		**Back Half Blank** (Analytical Fraction 2A)
	Lab Code:		K1002411-004,-011		K1002411-011,-012
	Date Analyzed:		04/02/10		04/02/10
Analyte	**EPA Method**	**Front Half MRL**		**Back Half MRL**	
Chromium	29/200.8	1.0	ND	0.1	0.5

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	NA
Sample Matrix:	Misc.	**Date Received:**	NA
		Date Extracted:	03/30/10

Total Metals
Units: Micrograms (μg)

		Sample Name:	**Method Blank - Front Half**		**Method Blank - Back Half**
		Lab Code:	K1002411-MBF		K1002411-MBB
		Date Analyzed:	04/02/10		04/02/10
Analyte	**EPA Method**	**Front Half MRL**		**Back Half MRL**	
Chromium	29/200.8	1.0	ND	0.1	0.1

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	03/11/10
Sample Matrix:	Misc.	**Date Received:**	03/15/10
		Date Extracted:	03/30/10
		Date Analyzed:	04/02/10

Duplicate Summary
Total Metals
Units: Micrograms (µg)
(Field Blank Corrected)

Sample Name: Back Half Run - 1 (Analytical Fraction 2A)
Lab Code: K1002411-008D

Analyte	**EPA Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**
Chromium	29/200.8	0.1	13.8	13.6	13.7	1

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	03/11/10
Sample Matrix:	Misc.	**Date Received:**	03/15/10
		Date Extracted:	03/30/10
		Date Analyzed:	04/02/10

Matrix Spike Summary
Total Metals
Units: Micrograms (μg)
(Field Blank Corrected)

Sample Name: Back Half Run - 1 (Analytical Fraction 2A)
Lab Code: K1002411-008S

Analyte	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**
Chromium	0.1	7.9	13.8	22.3	108	70-130

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	04/02/10

Laboratory Control Sample Summary (Front Half)
Total Metals
Units: µg/L (ppb)

Source: CAS Spike Solution

Analyte	**EPA Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**
Chromium	29/200.8	100	101	101	85-115

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Horizon Engineering, LLC	**Service Request:**	K1002411
Project:	St. Gobain F5 Inlet/3472	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	04/02/10

Laboratory Control Sample Summary (Back Half)
Total Metals
Units: µg/L (ppb)

Source: CAS Spike Solution

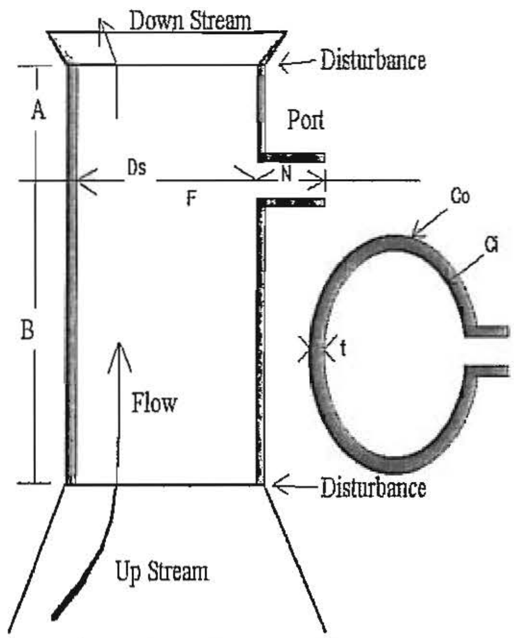
Analyte	**EPA Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**
Chromium	29/200.8	20	21.2	106	85-115

Traverse Point Locations

Saint Gobain Containers
Furnace #5, CC Inlet
Seattle, WA
EPA 1

11-Mar-10
PS
3472
mew

Outer Circumference	Co	in	
Wall thickness	t	in	
INSIDE of FAR WALL to OUTSIDE of Nipple	F	in	42.00
INSIDE of NEAR WALL to OUTSIDE of Nipple	N	in	6
STACK WALL to to OUTSIDE of Nipple	N-t	in	
DOWNstream Disturb	A	in	73.0
UPstream Disturb	B	in	94.0
Inner Diameter	Ds	in	36
Area	As	sqin	1017.9
DOWNstream Ratio	A/Ds		2.03
UPstream Ratio	B/Ds		2.61
Minimum #Pts (Particulate)			24
Minimum #Pts/Diameter			12
Minimum #Pts (NON-Particulate)			16
Minimum #Pts/Diameter			8
Actual Points per Diameter			12
Actual Points Used			24



Trav Pt #No	Fract Stk ID (f)	Stack ID (Ds)	Actual Points (Dsxf)	Nearest 8ths (TP)	Adjusted Points (TP)	Traverse Points (TP + N)	Traverse Points (TP + N)
1	2.13%	36.0	0.8	0.75	1	7	7
2	6.70%	36.0	2.4	2.375	2.375	8.375	8 3 / 8
3	11.81%	36.0	4.3	4.25	4.25	10.25	10 1 / 4
4	17.73%	36.0	6.4	6.375	6.375	12.375	12 3 / 8
5	25.00%	36.0	9.0	9	9	15	15
6	35.57%	36.0	12.8	12.75	12.75	18.75	18 3 / 4
7	64.43%	36.0	23.2	23.25	23.25	29.25	29 1 / 4
8	75.00%	36.0	27.0	27	27	33	33
9	82.27%	36.0	29.6	29.625	29.625	35.625	35 5 / 8
10	88.19%	36.0	31.7	31.75	31.75	37.75	37 3 / 4
11	93.30%	36.0	33.6	33.625	33.625	39.625	39 5 / 8
12	97.87%	36.0	35.2	35.25	35	41	41

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TRAVERSE POINT LOCATIONS WORKSHEET

Client & Source Saint Gobain
Sampling location Furnace #5 CC. Inlet
Date 20200310 Initials PS

Traverse Point Number	Traverse Point Location (inches)
1	7
2	8 3/8
3	10 1/4
4	12 3/8
5	15
6	18 3/4
7	29 1/4
8	33
9	35 5/8
10	37 3/4
11	39 5/8
12	41

Duct Dimensions and Port Locations

Inside of far wall to outside of nipple, F 42"
Inside of near wall to outside of nipple, N 6"
Nearest downstream disturbance, A 73"
Nearest upstream disturbance, B 94"
Circular: Inside Diameter, F-N 36"
Rectangular: Width — " Depth — "
Number of Ports: 2

Circle duct characteristics:

Construction: Steel, PVC, Fiberglas, Other ______
Shape: Circular, Rectangular
Orientation: Vertical, Horizontal
Flow straighteners: Yes No
Extension: Yes No
Cyclonic Flow Expected: Yes No
Cyclonic Flow Measured Yes No
Average Null Angle <20° Yes No
Meets EPA M-1 Criteria: Yes No

Test port sketch or comments

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Tedlar Bag Analysis Data Sheet
Client: St. Gobain
Leak Checks: Pre-test______ Post-test______

Job No.: 3472
Tester: PS
Test Date: 201003 11

		Cylinder No.	Cylinder Value	Start Response	End Response
Time:	12:45				
Gas: O_2		0-14	22.26	22.3	22.3
Range 0-25					
Analyzer Model	Servomex 1400				
Analyzer SN.	000012				
Gas: CO_2		22	12.38	12.4	12.4
Range 0-25					
Analyzer Model	Servomex 1400				
Analyzer SN.	000050				
Gas: O_2/CO_2	〃	0-10	11.5/0	11.4/0	11.4/0
Range					
Analyzer Model					
Analyzer SN.					
Gas: CO_2/O_2	〃	〃	6.01/0	5.9/0	5.9/0
Range 0-25					
Analyzer Model					
Analyzer SN.					

Sample ID:	Bag Appearance:	Time:	Analysis O_2 %	CO_2 %	CO ppm	NO_x ppm	VOC ppm	SO_2 ppm
Run #1		13:00	19.0	3.6				
Run #2		13:05	19.2	3.0				
Run #3		16:51	19.0	3.8				

Describe Sampling Setup: Tedlar Bags pulled from the meter box.

Production/Process Data

Furnace Operating Data

Saint-Gobain Containers, Inc., Seattle Plant
Furnace Operating Data
March 11, 2010

Test Times	**3/11/2010**
Run 1	08:25 – 10:28
Run 2	10:50 – 13:57
Run 3	14:10 – 17:16
Run 4	NA
Run 5	NA
Furnace #	**5**
Pull Rate (Tons Glass/Day)	75.2
Gas (scfh)	14514
Oil (gal/hr) #2 Ultra-low Sulfer Diesel	0
Oxygen (scfh)	25743
Air (scfh)	0
Electric Boost (kW)	1086
Bridgewall Temp (F)	2681
Cullet Ratio (%)	31
Glass Color	Emerald Green

Calibration Information

Meter Box

Calibration Critical Orifices

Standard Meter

Pitots

Shortridge Micromanometer

Thermocouples and Indicators

Barometer

Calibration Gas Certificates

Biannual Meterbox Calibration

Method	EPA M-5 #7.2				
Location	Horizon Shop		Date	1/15/10	
Meter Box ID	4		Pb=	30.10	(in Hg)
Meter ID	3623996		Ta=	54	(oF)
calibrated by	PT		Tamb	514	(oR)

Leak checks

Negative	0.0	in/min @ 28.00	inches Hg
Positive	0.0	in/min @ 2.30	inches H20

0.97<Y<1.03	Old 8/3/09	New 1/15/10	Change (+/-)	
Y=	0.97351	0.98392	1.1%	pass
dH@=	1.68544	1.65610	-1.8%	

	VAC (in Hg)	Critical Orifice ID	K	dH (inH2O)	Meter (ft3)	Net (ft3)	Field Tdi (oF)	Meter Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Y 0.020	dH@ 0.20	Allow. Tolerance
Initial	18.0	55.0	0.46025	1.10	334.8500	5.4480	58.0	57.0	517.0	517.5	9.00	0.98121	1.62547	0.003	0.03	
Final					340.2980		58.0	57.0						pass	pass	
Initial	14.5	63.0	0.59166	1.80	340.2980	5.0160	59.0	57.0	517.0	518.5	6.50	0.98967	1.63666	0.006	0.02	
Final					345.3140		61.0	57.0						pass	pass	
Initial	16.5	73.0	0.81187	3.60	345.3140	5.8760	62.0	57.0	517.5	520.8	5.50	0.98088	1.70616	0.003	0.05	
Final					351.1900		66.0	58.0						pass	pass	
												0.98392	1.65610	0.00230	0.02002	

Post Test Meterbox Calibration

Method EPA M-5 #7.2
Location Shop
Meter Box 4
calibrated by PT

Date 03/12/2010
Pb= 29.70 (in Hg)
Ta= 60 (oF)
Tamb 520 (oR)

	Biannual 1/15/10	Post-Test 03/12/2010	Change (+/-)	
Y=	0.98392	0.98145	-0.3%	pass
dH@=	1.65610	1.80775	8.4%	

	VAC (in Hg)	Critical Orifice ID	K	dH (inH2O)	Meter (ft3)	Net (ft3)	Field Tdi (oF)	Meter Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Y 0.020	dH@ 0.20	Allow. Tolerance
Initial	19.0	63.0	0.59166	1.90	983.5390	6.9180	55.0	57.0	515.5	515.5	9.00	0.98180	1.81136	0.000	0.00	
Final					990.4570		56.0	54.0						pass	pass	
Initial	19.0	63.0	0.59166	1.90	990.4570	5.3870	56.0	54.0	514.5	515.3	7.00	0.98017	1.81062	0.001	0.00	
Final					995.8440		56.0	55.0						pass	pass	
Initial	19.0	63.0	0.59166	1.90	995.8440	8.4790	56.0	55.0	515.5	517.3	11.00	0.98239	1.80126	0.001	0.01	
Final					1004.3230		62.0	56.0						pass	pass	
												0.98145	1.80775	0.00051	0.00259	

Method	EPA M-5 #7.2	Date	3/12/10
Location	Horizon	Pb=	29.7 (in Hg)
Meter Box	4	Ta=	60 (oF)
Meter ID	10323996		
Calibrated by	PT	Leak Check Rate	0.000 in/min

	VAC (inHg)	Critical Orifice	K	dH inH2O	Meter (ft3)	Field Tdi (oF)	Meter Tdo (oF)	Time t (min)
Initial	19	63	.59164	1.9	983.539	55	57	9
Final					990.457	56	54	
Initial	↓	↓	↓	↓	990.457	56	54	7
Final					995.844	59	55	
Initial					995.844	59	55	11
Final					4.323	62	56	

*If the box leaks or doesn't calibrate for any reason please let report writer know ASAP and document it.
Be sure to update new K values from annual calibrations when entering data into spreadsheet.
You must collect at least 5 cuft.
****For post-test calibrations in field (New 10.3.2, Old 5.3.2) Select orifice nearest to operational conditions
Make 3 runs of 5 cuft each.
Comments:

Method	EPA M-5 #7.2	Date	
Location		Pb=	(in Hg)
Meter Box		Ta=	(oF)
Meter ID			
Calibrated by		Leak Check Rate	in/min

	VAC (inHg)	Critical Orifice	K	dH inH2O	Meter (ft3)	Field Tdi (oF)	Meter Tdo (oF)	Time t (min)
Initial								
Final								
Initial								
Final								
Initial								
Final								

*If the box leaks or doesn't calibrate for any reason please let report writer know ASAP and document it.
Be sure to update new K values from annual calibrations when entering data into spreadsheet.
You must collect at least 5 cuft.
****For post-test calibrations in field (New 10.3.2, Old 5.3.2) Select orifice nearest to operational conditions
Make 3 runs of 5 cuft each.
Comments:

Critical Orifice Calibrations

Set	Shop #1
Job #	in house
Date:	12/1/09
DGM (Y) =	0.99633
DGM ID #	standard
Calibrated by:	PMW

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*** Minimum 5 minute Runs ***

Dry Gas Meter			Orifice ID # 73		Orifice ID # 63		Orifice ID # 55		Orifice ID # 48		Orifice ID # 40	
K' Critical Orifice Coefficient			0.81187		0.59166		0.46025		0.34725		0.23720	
	Symbol	Units	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2
Initial volume	Vi	ft^3	505.275	512.687	537.823	545.637	498.675	501.673	492.573	496.184	488.100	491.027
Final Volume	Vf	ft^3	512.687	521.176	545.552	550.658	501.673	505.275	496.184	498.675	491.027	492.574
Difference	Vm	ft^3	7.412	8.489	7.729	5.021	2.998	3.602	3.611	2.491	2.927	1.547
Temperatures												
Ambient		°F	56.2	56.2	56.4	56.2	56.2	56.2	55.6	55.8	55.4	55.2
Absolute ambient	Ta	°R	515.9	515.9	516.1	515.9	515.9	515.9	515.3	515.5	515.1	514.9
Initial Inlet	Ti	°F	66.9	74.3	65.3	68.9	66.8	66.0	62.2	63.9	62.2	62.5
Outlet	Tf	°F	58.4	59.3	58.8	59.3	58.0	58.0	57.2	57.5	57.1	57.2
Final Inlet	Ti	°F	76.5	77.9	71.4	71.8	64.6	68.0	64.0	64.7	62.3	62.1
Outlet	Tf	°F	59.4	60.4	59.4	59.6	57.7	58.3	57.5	57.7	57.2	57.2
Avg. Temp	Tm	°R	525.0	527.6	523.4	524.6	521.4	522.2	519.9	520.6	519.4	519.4
Time		min	7	8	10	6	5	6	8	5	9	5
		sec	0	0	0	30	0	0	0	30	30	0
			7.00	8.00	10.00	6.50	5.00	6.00	8.00	5.50	9.50	5.00
Orifice man. rdg	dH@	in H2O	4.200	4.200	2.200	2.200	1.300	1.300	0.710	0.710	0.320	0.320
Barometric. Pressure	Pbar	inHg	30.55	30.55	30.55	30.55	30.55	30.55	30.55	30.55	30.55	30.55
Pump vacuum		inHg	12.0	12.0	15.0	15.0	17.0	17.0	18.0	18.0	19.0	19.0
K' factor			0.81307	0.81068	0.59255	0.59078	0.46033	0.46018	0.34687	0.34763	0.23674	0.23767
K' factor Average				0.81187		0.59166		0.46025		0.34725		0.23720
% Error (+/- 0.5)		%		0.15%		0.15%		0.02%		0.11%		0.20%
Vcr(std)			7.6554	8.7233	7.9686	5.1651	3.0958	3.7138	3.7347	2.5727	3.0275	1.5999
Vm(std)			7.6836	8.7554	7.9980	5.1841	3.1072	3.7275	3.7484	2.5822	3.0386	1.6058
Y			0.9963	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963

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Standard Meter Calibration
ID# 2299046
Northwest Natural, Gas Meter Division

	NEW METER NUMBER	SIZE	PERF #	NEW ERT#	INDEX READING
SET ☐					
CHANGE ☐ REMOVAL ☐	OLD METER NUMBER	SIZE	OLD PERF #	OLD ERT#	OLD INDEX READING

SERVICE ADDRESS	SPACE OR APT NO.	CITY

METER LEFT	EQUIP LEFT	CURB LEFT	CUST VALVE	LOC.	INS.	BS.	BW.	PDL
ON / OFF	ON / OFF	ON / OFF	ON / OFF					

GREEN TAG	YELLOW TAG	TIED	NOT TIED	MTR PRESSURE	6.5 INWC @ 130 CFH	2LB	OVER 2LB
YES / NO	YES / NO						

REMARKS Meter tested at 3 flow rates only.

Completed By: Date:

METER SAMPLE 1	WRONG SIZE 2	INDEX IMPAIRED 3	DR 4	METER IMPAIRED 6		
ERT DAMAGE 7	LEAK 8	SET WRONG 14	LIQUIDS 15	DEMAND TEST 18		
OTHER 19	CORROSION 20	NO USE 21	PCC 24	Unauthorized Gas/Vandalism 27	FIRE 28	← FOR METER CHANGES/ REMOVALS ONLY ←

F-8735 METER RECORD (Rev 0807) PART 1

FOR METER SHOP ONLY

COMMENTS/TEST CODES	INCOMING TESTS	
80% - 99.6	OPEN	
60% - 99.6	CHECK	
30% - 99.7	INDEX READ	ERT READ

TEST DATE	INITIALS	METER
6/9/09	JM	S-275

Method: #2 sec 4 WT   Location: Whitaker Shop

Pitot	Date Tested	Cp	S	Pitot	Date Tested	Cp	S	Pitot	Date Tested	Cp	S	Pitot	Date Tested	Cp	S
3-1	9/29/2009	0.8268	0.001	3-8	9/29/2009	0.8328	0.002					4-7	9/28/2009	0.7871	0.009
3-2	10/1/2009	0.8375	0.003	3-9	9/29/2009	0.8195	0.002	4-2	9/29/2009	0.8290	0.003	4-8	9/29/2009	0.8380	0.002
3-3	9/29/2009	0.8370	0.004	3-10	9/29/2009	0.8328	0.002	4-3	9/29/2009	0.8392	0.000	4-9	9/29/2009	0.7971	0.005
3-4	9/29/2009	0.8233	0.004	3-11	9/29/2009	0.8188	0.003	4-4	9/29/2009	0.8346	0.005	4-10	9/29/2009	0.8173	0.002
3-5	9/29/2009	0.8056	0.002					4-5	9/29/2009	0.8254	0.003	4-11	10/5/2009	0.8274	0.003
3-6	9/29/2009	0.8227	0.004	3-13	9/29/2009	0.8103	0.004	4-6	9/29/2009	0.8259	0.005	4-12	10/5/2009	0.7914	0.006
3-7	10/5/2009	0.8210	0.006	3-14	10/26/09	0.8092	0.004								

		DpP (P-Type)	DpS (S-Type)	Cp	dS	Ave Cp	S <0.01
	3-1	0.320	0.460	0.8257	0.001	0.8268	0.001
Status	Pass	0.620	0.890	0.8263	0.000		
Date	9/29/2009	1.050	1.500	0.8283	0.002		
Tester	PS						
	3-2	0.350	0.490	0.8367	0.001	0.8375	0.003
Status	Pass	0.665	0.920	0.8417	0.004		
Date	10/1/2009	1.100	1.550	0.8340	0.003		
Tester	JL						
	3-3	0.330	0.460	0.8365	0.002	0.8370	0.004
Status	Pass	0.640	0.910	0.8302	0.007		
Date	9/29/2009	1.100	1.520	0.8422	0.005		
Tester	PS						
	3-4	0.350	0.510	0.8201	0.003	0.8233	0.004
Status	Pass	0.680	0.970	0.8269	0.006		
Date	9/29/2009	1.100	1.600	0.8209	0.002		
Tester	PS						
	3-5	0.330	0.500	0.8043	0.001	0.8056	0.002
Status	Pass	0.640	0.970	0.8042	0.001		
Date	9/29/2009	1.100	1.650	0.8083	0.003		
Tester	PS						
	3-6	0.350	0.500	0.8283	0.006	0.8227	0.004
Status	Pass	0.650	0.950	0.8189	0.004		
Date	9/29/2009	1.100	1.600	0.8209	0.002		
Tester	PS						
	3-7	0.330	0.470	0.8296	0.009	0.8210	0.006
Status	Pass	0.640	0.950	0.8126	0.008		
Date	10/5/2009	1.100	1.600	0.8209	0.000		
Tester	PS						
	3-8	0.330	0.470	0.8296	0.003	0.8328	0.002
Status	Pass	0.640	0.900	0.8348	0.002		
Date	9/29/2009	1.100	1.550	0.8340	0.001		
Tester	PS						
	3-9	0.330	0.480	0.8209	0.001	0.8195	0.002
Status	Pass	0.640	0.940	0.8169	0.003		
Date	9/29/2009	1.100	1.600	0.8209	0.001		
Tester	PS						
	3-10	0.330	0.470	0.8296	0.003	0.8328	0.002
Status	Pass	0.640	0.900	0.8348	0.002		
Date	9/29/2009	1.100	1.550	0.8340	0.001		
Tester	PS						
	3-11	0.330	0.480	0.8209	0.002	0.8188	0.003
Status	Pass	0.650	0.960	0.8146	0.004		
Date	9/29/2009	1.100	1.600	0.8209	0.002		
Tester	PS						
Status							
Date							
Tester							
	3-13	0.340	0.500	0.8164	0.006	0.8103	0.004
Status	Pass	0.650	0.980	0.8063	0.004		
Date	9/29/2009	1.100	1.650	0.8083	0.002		
Tester	PS						
	3-14	0.340	0.515	0.8044	0.005	0.8092	0.004
Status	Pass	0.635	0.955	0.8073	0.002		
Date	10/26/09	1.100	1.620	0.8158	0.007		
Tester	JL						

		DpP (P-Type)	DpS (S-Type)	Cp	dS	Ave Cp	S <0.01
Status							
Date							
Tester							
	4-2	0.320	0.460	0.8257	0.003	0.8290	0.003
Status	Pass	0.630	0.890	0.8329	0.004		
Date	9/29/2009	1.050	1.500	0.8283	0.001		
Tester	PS						
	4-3	0.330	0.460	0.8365	0.001	0.8392	0.000
Status	Pass	0.640	0.890	0.8395	0.000		
Date	9/29/2009	1.100	1.530	0.8394	0.000		
Tester	PS						
	4-4	0.340	0.470	0.8420	0.007	0.8346	0.005
Status	Pass	0.650	0.930	0.8277	0.007		
Date	9/29/2009	1.100	1.550	0.8340	0.001		
Tester	PS						
	4-5	0.320	0.460	0.8257	0.000	0.8254	0.003
Status	Pass	0.660	0.940	0.8296	0.004		
Date	9/29/2009	1.100	1.600	0.8209	0.005		
Tester	PS						
	4-6	0.340	0.490	0.8247	0.001	0.8259	0.005
Status	Pass	0.650	0.950	0.8189	0.007		
Date	9/29/2009	1.100	1.550	0.8340	0.008		
Tester	PS						
	4-7	0.190	0.280	0.8013	0.014	0.7871	0.009
Status	Pass	0.450	0.720	0.7627	0.004		
Date	9/28/2009	0.740	1.200	0.7774	0.010		
Tester	PT						
	4-8	0.310	0.430	0.8406	0.003	0.8380	0.002
Status	Pass	0.600	0.840	0.8367	0.001		
Date	9/29/2009	1.000	1.400	0.8367	0.001		
Tester	PS						
	4-9	0.320	0.500	0.7920	0.005	0.7971	0.005
Status	Pass	0.620	0.940	0.8040	0.007		
Date	9/29/2009	1.000	1.550	0.7952	0.002		
Tester	PS						
	4-10	0.340	0.500	0.8164	0.001	0.8173	0.002
Status	Pass	0.650	0.960	0.8146	0.003		
Date	9/29/2009	1.100	1.600	0.8209	0.004		
Tester	PS						
	4-11	0.310	0.440	0.8310	0.004	0.8274	0.003
Status	Pass	0.610	0.870	0.8290	0.002		
Date	10/5/2009	1.000	1.450	0.8222	0.005		
Tester	PS						
	4-12	0.320	0.490	0.8000	0.009	0.7914	0.006
Status	Pass	0.620	0.970	0.7916	0.000		
Date	10/5/2009	1.000	1.600	0.7827	0.009		
Tester	PS						

Month: Jan, Feb		Testers: PT, PTH, NY, PW, JMH			Location: Horizon Shop					
Thermocouple Indicator	Channel	Ambient Standard, F	Ambient Measured, F	Ambient Difference %	220 +/- Standard, F	220 +/- Measured, F	220 +/- Difference %	400 +/- Standard, F	400 +/- Measured, F	400 +/- Difference %
Meter Box 4	STACK	100	99	0.18%	200	199	0.15%	400	399	0.12%
1/15/2010	PROBE	100	100	0.00%	200	200	0.00%	400	400	0.00%
	FILTER	100	100	0.00%	200	199	0.15%	400	399	0.12%
	IMPINGER	100	99	0.18%	200	199	0.15%	400	399	0.12%
	METER IN	100	102	-0.36%	200	202	-0.30%	400	402	-0.23%
	METER OUT	100	102	-0.36%	200	202	-0.30%	400	402	-0.23%
Meter Box 5	STACK	50	48	0.39%	200	197	0.45%	400	398	0.47%
2/3/2010	PROBE	50	52	-0.39%	200	193	1.06%	400	398	0.47%
	FILTER	50	50	0.00%	200	199	0.15%	400	391	1.05%
	IMPINGER	50	50	0.00%	200	202	-0.30%	400	400	0.00%
	AUX	50	50	0.00%	200	201	-0.15%	400	399	0.12%
	METER IN	50	48	0.39%	200	199	0.15%	400	397	0.35%
	METER OUT	50	48	0.39%	200	198	0.30%	400	398	0.47%
Meter Box 6	STACK	100	51.5	8.67%	200	226.9	-4.08%	425	427.1	-0.24%
1/13/2010	PROBE	100	52.3	8.52%	200	227.8	-4.21%	425	428	-0.34%
	FILTER	100	52	8.58%	200	227.5	-4.17%	425	427.5	-0.28%
	IMPINGER	100	51.2	8.72%	200	226.8	-4.06%	425	427	-0.23%
	METER IN	100	52	8.58%	200	227	-4.08%	425	426	-0.11%
	METER OUT	100	52	8.58%	200	226	-3.94%	425	426	-0.11%
Meter Box 7	STACK	50	52	-0.39%	225	227	-0.29%	425	427	-0.23%
1/13/2010	PROBE	50	52	-0.39%	225	228	-0.44%	425	429	-0.45%
	FILTER	50	53	-0.59%	225	228	-0.44%	425	429	-0.45%
	IMPINGER	50	52	-0.39%	225	227	-0.29%	425	427	-0.23%
	AUX	50	52	-0.39%	225	227	-0.29%	425	427	-0.23%
	METER IN	50	52	-0.39%	225	226	-0.15%	425	426	-0.11%
	METER OUT	50	53	-0.59%	225	224	0.15%	425	427	-0.23%
Meter Box 8	STACK	50	50	0.00%	225	225	0.00%	425	425	0.00%
1/11/2010	PROBE	50	51	-0.20%	225	226	-0.15%	425	426	-0.11%
	FILTER	50	52	-0.39%	225	226	-0.15%	425	426	-0.11%
	IMPINGER	50	50	0.00%	225	224	0.15%	425	424	0.11%
	AUX	50	50	0.00%	225	224	0.15%	425	424	0.11%
	METER IN	50	52	-0.39%	200	202	-0.30%	400	403	-0.35%
	METER OUT	50	52	-0.39%	200	203	-0.45%	400	403	-0.35%
Meter Box 9	STACK	100	97	0.54%	200	199	0.15%	400	398	0.23%
1/18/2010	PROBE	100	97	0.54%	200	199	0.15%	400	398	0.23%
	FILTER	100	97	0.54%	200	199	0.15%	400	397	0.35%
	IMPINGER	100	97	0.54%	200	199	0.15%	400	397	0.35%
	AUX	100	97	0.54%	200	199	0.15%	400	398	0.23%
	METER IN	100	100	0.00%	200	202	-0.30%	400	401	-0.12%
	METER OUT	100	101	-0.18%	200	202	-0.30%	400	402	-0.23%
Meter Box 13	STACK	75	78	-0.56%	200	203	-0.45%	400	404	-0.47%
1/11/2010	PROBE	75	78	-0.56%	200	202	-0.30%	400	404	-0.47%
	FILTER	75	78	-0.56%	200	207	-1.06%	400	402	-0.23%
	IMPINGER	75	79	-0.75%	200	204	-0.61%	400	406	-0.70%
	AUX	75	80	-0.94%	200	204	-0.61%	400	404	-0.47%
	METER IN	75	78	-0.56%	200	203	-0.45%	400	404	-0.47%
	METER OUT	75	78	-0.56%	200	204	-0.61%	400	404	-0.47%
Meter Box 14	STACK	100	98	0.36%	200	198	0.30%	400	394	0.70%
1/13/2010	PROBE	100	99	0.18%	200	200	0.00%	400	400	0.00%
	FILTER	100	97	0.54%	200	197	0.45%	400	396	0.47%
	IMPINGER	100	99	0.18%	200	199	0.15%	400	397	0.35%
	AUX	100	98	0.36%	200	199	0.15%	400	398	0.23%
	METER IN	100	98	0.36%	200	198	0.30%	400	397	0.35%
	METER OUT	100	100	0.00%	200	201	-0.15%	400	398	0.23%
Liter Meter 15	Probe	50	51	-0.20%	200	202	-0.30%	400	401	-0.12%
2/10/2010	Filter	50	48	0.39%	200	200	0.00%	400	402	-0.23%
	Aux-1	50	51	-0.20%	200	199	0.15%	400	401	-0.12%
	Aux-2	50	49	0.20%	200	200	0.00%	400	400	0.00%
	METER IN	50	51	-0.20%	200	202	-0.30%	400	404	-0.47%
	METER OUT	50	50	0.00%	200	201	-0.15%	400	403	-0.35%
Liter Meter 16	Probe	50	51	-0.20%	200	205	-0.76%	400	402	-0.23%
2/10/2010	Filter	50	47	0.59%	200	197	0.45%	400	397	0.35%
	Aux-1	50	52	-0.39%	200	202	-0.30%	400	402	-0.23%
	Aux-2	50	53	-0.59%	200	203	-0.45%	400	402	-0.23%
	METER IN	50	51	-0.20%	200	202	-0.30%	400	403	-0.35%
	METER OUT	50	52	-0.39%	200	201	-0.15%	400	402	-0.23%
Liter Meter 17	Probe	50	47	0.59%	200	199	0.15%	400	399	0.12%
2/10/2010	Filter	50	50	0.00%	200	202	-0.30%	400	399	0.12%
	Aux-1	50	50	0.00%	200	203	-0.45%	400	404	-0.47%
	Aux-2	50	51	-0.20%	200	203	-0.45%	400	402	-0.23%
	METER IN	50	52	-0.39%	200	202	-0.30%	400	402	-0.23%
	METER OUT	50	52	-0.39%	200	202	-0.30%	400	403	-0.35%
Meter Box 19	STACK	100	98	0.36%	200	199	0.15%	400	398	0.23%
1/13/2010	PROBE	100	97	0.54%	200	198	0.30%	400	396	0.47%
	FILTER	100	97	0.54%	200	198	0.30%	400	397	0.35%
	IMPINGER	100	98	0.36%	200	199	0.15%	400	399	0.12%
	AUX	100	98	0.36%	200	199	0.15%	400	398	0.23%
	METER IN	100	97	0.54%	200	198	0.30%	400	397	0.35%
	METER OUT	100	98	0.36%	200	199	0.15%	400	398	0.23%
Meter Box 20	STACK	100	96	0.71%	200	198	0.30%	400	396	0.47%
1/22/2010	PROBE	100	96	0.71%	200	198	0.30%	400	396	0.47%
	OVEN	100	96	0.71%	200	198	0.30%	400	396	0.47%
	BH FILTER	100		17.87%	200		30.32%	400		46.53%
	IMPINGER	100	96	0.71%	200	198	0.30%	400	396	0.47%
	AUX	100	96	0.71%	200	198	0.30%	400	396	0.47%
	METER OUT	100	100	0.00%	200	201	-0.15%	400	400	0.00%
Meter Box 21	STACK	50	46	0.78%	225	224	0.15%	425	422	0.34%
1/14/2010	PROBE	50	46	0.78%	225	224	0.15%	425	422	0.34%
	OVEN	50	47	0.59%	225	224	0.15%	425	422	0.34%
	BH FILTER	50		9.81%	225		32.80%	425		48.04%
	IMPINGER	50	47	0.59%	225	225	0.00%	425	422	0.34%
	AUX	50	47	0.59%	225	224	0.15%	425	423	0.23%
	METER OUT	50	47	0.59%	225	224	0.15%	425	422	0.34%
Fluke 074	1			0.00%			0.00%			0.00%
	2			0.00%			0.00%			0.00%
Fluke 197	1			0.00%			0.00%			0.00%
	2			0.00%			0.00%			0.00%
Fluke 198	1			0.00%			0.00%			0.00%
	2			0.00%			0.00%			0.00%
Fluke 227	1			0.00%			0.00%			0.00%
	2			0.00%			0.00%			0.00%
Fluke 228	1			0.00%			0.00%			0.00%
	2			0.00%			0.00%			0.00%

Thermocouple Calibrations

Testers: PT, PTH, NY, JMH, PW							Location: Horizon Shop
		Ambient			Heated		
Meterbox		Standard, F	Measured, F	Difference %	Standard, F	Measured, F	Difference %
4	In	54.0	55.0	-0.19%	258.0	258.0	0.00%
1/15/10	Out	54.0	53.0	0.19%	283.0	281.0	0.27%
5	In	63.1	62.2	0.17%	382.5	382.4	0.01%
2/3/10	Out	63.6	64.0	-0.08%	220.0	219.0	0.15%
6	In	56.0	56.0	0.00%	270.0	272.0	-0.27%
1/13/10	Out	52.0	53.0	-0.20%	223.0	225.0	-0.29%
7	In	53.0	54.0	-0.20%	186.0	187.0	-0.15%
1/13/10	Out	56.0	55.0	0.19%	223.0	223.0	0.00%
8	In	56.8	57.8	-0.19%	256.1	250.8	0.74%
1/11/10	Out	58.2	60.1	-0.37%	257.0	261.2	-0.59%
9	In	56.0	57.0	-0.19%	231.0	232.0	-0.14%
1/18/10	Out	56.0	55.0	0.19%	263.0	263.0	0.00%
13	In	61.1	60.5	0.12%	403.1	397.5	0.65%
1/11/10	Out	55.0	54.3	0.14%	398.5	408.4	-1.15%
14	In	53.0	52.0	0.20%	215.0	217.0	-0.30%
1/13/10	Out	55.0	54.0	0.19%	270.0	271.0	-0.14%
19	In	57.0	57.0	0.00%	220.0	221.0	-0.15%
1/13/10	Out	56.0	57.0	-0.19%	206.0	207.0	-0.15%
20	In	NA	NA		NA	NA	
1/22/10	Out	55.0	56.0	-0.19%	231.0	230.0	0.14%
21	In	NA	NA		NA	NA	
1/14/10	Out	61.0	59.0	0.38%	157.0	157.0	0.00%
		Ambient			Heated		
Liter Meter		Standard, F	Measured, F	Difference %	Standard, F	Measured, F	Difference %
15	In	55.2	56.1	-0.17%	420.2	425.3	-0.58%
2/10/10	Out	55.2	56.0	-0.16%	429.3	432.3	-0.34%
16	In	54.6	54.1	0.10%	415.9	406.2	1.11%
2/10/10	Out	54.6	54.8	-0.04%	420.2	425.6	-0.61%
17	In	55.1	56.2	-0.21%	405.7	412.3	-0.76%
2/10/10	Out	55.1	54.8	0.06%	415.6	417.6	-0.23%

		Personnel: JL			Location: Horizon Shop					
		Ambient			Heated			Ice		
	Date	Standard, F	Measured, F	Difference %	Standard, F	Measured, F	Difference %	Standard, F	Measured, F	Difference %
Sample Box - impinger out										
I-01	2/25/2010	56.7	56.5	0.04%	x	x		34.7	34.5	0.04%
I-02	2/24/2010	57.9	58.3	-0.08%	x	x		34.5	35.1	-0.12%
I-03	2/24/2010	58.5	59.1	-0.12%	x	x		35.4	35.3	0.02%
I-04	2/24/2010	57.7	58.0	-0.06%	x	x		36.2	36.9	-0.14%
I-05	2/24/2010	58.3	57.9	0.08%	x	x		36.3	36.7	-0.08%
I-06	2/25/2010	56.9	56.5	0.08%	x	x		39.0	38.9	0.02%
I-07	2/24/2010	58.1	57.6	0.10%	x	x		35.5	36.5	-0.20%
I-08	2/24/2010	58.1	57.7	0.08%	x	x		35.1	35.2	-0.02%
I-09	2/24/2010	58.3	57.9	0.08%	x	x		40.2	39.7	0.10%
I-10	2/24/2010	58.4	58.6	-0.04%	x	x		36.9	36.3	0.12%
I-11	2/24/2010	58.3	57.8	0.10%	x	x		40.1	41.7	-0.32%
I-12	2/24/2010	57.8	57.9	-0.02%	x	x		35.1	35.6	-0.10%
I-13	2/25/2010	56.9	55.8	0.21%	x	x		35.1	35.6	-0.10%
I-14	2/24/2010	58.2	57.9	0.06%	x	x		34.5	35.0	-0.10%
I-15	2/25/2010	57.1	57.5	-0.08%	x	x		35.2	35.0	0.04%
I-16	2/24/2010	58.9	57.9	0.19%	x	x		41.1	41.7	-0.12%
I-17	2/25/2010	57.3	57.5	-0.04%	x	x		42.5	42.4	0.02%
Sample Box - oven										
017	2/12/2010	57.0	56.4	0.12%	198.0	198.0	0.00%	x	x	
018	2/11/2010	53.0	52.4	0.12%	203.8	202.4	0.21%	x	x	
019	2/15/2010	53.2	53.2	0.00%	206.8	206.2	0.09%	x	x	
020	2/12/2010	55.6	55.6	0.00%	204.6	205.6	-0.15%	x	x	
156	2/12/2010	52.6	53.0	-0.08%	199.2	200.6	-0.21%	x	x	
172	2/15/2010	53.2	53.0	0.04%	199.2	200.4	-0.18%	x	x	
173	2/11/2010	55.2	54.4	0.16%	199.6	199.8	-0.03%	x	x	
184	2/15/2010	53.8	53.4	0.08%	198.8	200.4	-0.24%	x	x	
185	2/12/2010	55.4	55.0	0.08%	208.4	207.2	0.18%	x	x	
186	2/11/2010	52.4	52.0	0.08%	200.0	200.0	0.00%	x	x	
187	2/12/2010	57.0	56.6	0.08%	207.2	207.0	0.03%	x	x	
188	2/11/2010	61.2	61.0	0.04%	204.2	206.0	-0.27%	x	x	
189	2/10/2010	54.2	53.2	0.19%	200.0	198.4	0.24%	x	x	
190	2/24/2010	56.1	55.9	0.04%	219.5	219.3	0.03%	x	x	
229	2/24/2010	56.1	55.9	0.04%	354.0	353.7	0.04%	x	x	
230	2/24/2010	56.1	56.0	0.02%	255.8	255.6	0.04%	x	x	
327	2/12/2010	56.2	55.8	0.08%	206.8	206.0	0.12%	x	x	
328	2/12/2010	55.4	54.6	0.16%	201.2	200.0	0.18%	x	x	
329	2/12/2010	55.4	54.6	0.16%	200.0	200.0	0.00%	x	x	
331	2/10/2010	54.8	54.0	0.16%	206.2	208.0	-0.27%	x	x	

Grant Edgel Company

MFG. RED COMET OVENS

TELEPHONE 254-6524 (AREA CODE 503)

4233 N. E. 147TH AVENUE • P. O. BOX 20116 • PORTLAND, OREGON 97220

LABORATORY PRIMARY STANDARDS

CERTIFICATE

FOR

Type K Thermocouple

1/4" x 36" w/plug

Serial# 200701, 200702, 200703

GRANT EDGEL PRIMARY STANDARDS LABORATORY

ID NO.

DATE

NEXT DUE

BY

Submitted By

Horizon Engineering

13585 NE Whittaker Way

Portland, OR 97230

LABORATORY PRIMARY STANDARDS

T/C #	32°F	212°F
200701	+.9	-1.3
200702	+.3	-1.0
200703	+.5	-.9

Certified By: Fluke Model 724 Serial# 9806098
Resubmission Date: 11-18-09

The accuracy stated on this certificate is traceable to the NATIONAL BUREAU OF STANDARDS through certification documents on file in the Metrology Laboratory of the Grant Edgel Company.

Test Conditions

AMBIENT TEMP.: 68°F

REL. HUMIDITY: 45%

DATE: 6-4-09

REPORT NO.: 09F-4

SERVICE ORDER: 20507

P.O. NUMBER:

Authorized Signatures

PERFORMED BY: RG

APPROVED BY: Bob Edgel

RESUBMISSION DATE: 6-4-10

Grant Edgel Company — MFG. RED COMET OVENS
TELEPHONE 254-6524 (AREA CODE 503)
4233 N. E. 147TH AVENUE · P. O. BOX 20116 · PORTLAND, OREGON 97220

LABORATORY PRIMARY STANDARDS

CERTIFICATE

LABORATORY PRIMARY STANDARDS

FOR

Altek Calibrator

Series 22

Serial# 10400304

GRANT EDGEL PRIMARY STANDARDS LABORATORY EQUIPMENT VALIDATION
ID NO
DATE
NEXT DUE
BY

Submitted By

Horizon Engineering

13585 NE Whittaker Way

Portland, OR 97230

Test	Error	Test	Error
0°F	+.5	300°F	-.5
50°F	-.5	350°F	-.5
100°F	-.6	400°F	-.6
150°F	-.5	450°F	-.6
200°F	-.5	500°F	-1.1

Certified By:
Fluke Model 724
Serial# 9806098
Resubmission Date;
11-18-09

The accuracy stated on this certificate is traceable to the NATIONAL BUREAU OF STANDARDS through certification documents on file in the Metrology Laboratory of the Grant Edgel Company.

Test Conditions

AMBIENT TEMP.: 68°F

REL. HUMIDITY: 45%

DATE: 6-4-09

REPORT NO.: 09F-1

SERVICE ORDER: 20507

P.O. NUMBER:

Authorized Signatures

PERFORMED BY: RG

APPROVED BY: Bob Edgel

RESUBMISSION DATE: 6-4-10

A Satisfied Customer is Our First Consideration

CERTIFICATE

LABORATORY PRIMARY STANDARDS

GRANT EDGEL PRIMARY STANDARDS LABORATORY
ID NO
DATE
NEXT
BY

FOR

Type K Thermocouple
1/8" x 3" w/plug
Serial# 200602

Submitted By

Horizon Engineering
13585 NE Whittaker Way
Portland, OR 97230

Test	Error
32°F	-.8
212°F	-.6

Certified By: Fluke Model 724 Serial# 9806098
Resubmission Date: 11-18-09

The accuracy stated on this certificate is traceable to the NATIONAL BUREAU OF STANDARDS through certification documents on file in the Metrology Laboratory of the Grant Edgel Company.

Test Conditions

AMBIENT TEMP.: 68°F
REL. HUMIDITY: 45%
DATE: 6-4-09
REPORT NO.: 09F-3
SERVICE ORDER: 20507
P.O. NUMBER:

Authorized Signatures

PERFORMED BY: RG

APPROVED BY: Bob Edgel

RESUBMISSION DATE: 6-4-10

Grant Edgel Company MFG. RED COMET OVENS
TELEPHONE 254-6524 (AREA CODE 503)
4233 N.E. 147TH AVENUE P.O. BOX 20116 PORTLAND, OREGON 97220

LABORATORY PRIMARY STANDARDS

CERTIFICATE

LABORATORY PRIMARY STANDARDS

GRANT EDGEL PRIMARY STANDARDS LABORATORY
ID NO
DATE
NEXT
BY

FOR

Altek Calibrator

Series 22

Serial# 10663701

Submitted By

Horizon Engineering

13585 NE Whittaker Way

Portland, OR 97230

Test	Error	Test	Error
0°F	+.8	300°F	+.8
50°F	+.7	350°F	+.8
100°F	+.7	400°F	+.9
150°F	+.7	450°F	+.8
250°F	+.9	500°F	+.3

Certified By:
Fluke Model 724
Serial# 9806098
Resubmission Date:
11-18-09

The accuracy stated on this certificate is traceable to the NATIONAL BUREAU OF STANDARDS through certification documents on file in the Metrology Laboratory of the Grant Edgel Company.

Test Conditions

AMBIENT TEMP.: 68°F

REL. HUMIDITY: 45%

DATE: 6-4-09

REPORT NO.: 09F-2

SERVICE ORDER: 20507

P.O. NUMBER:

Authorized Signatures

PERFORMED BY: RG

APPROVED BY: Bob Edgel

RESUBMISSION DATE: 6-4-10

A Satisfied Customer is Our First Consideration

Nozzle ID	Measurements			Averages	Date
Quartz					
Q1	0.3170	0.3160	0.3165	**0.3165**	2/3/2010
Q2	0.2625	0.2630	0.2620	**0.2625**	5/1/2009
Q3	0.2515	0.2525	0.2530	**0.2523**	5/1/2009
Q4	0.2650	0.2645	0.2650	**0.2648**	3/11/2010
Q5	0.2645	0.2645	0.2640	**0.2643**	7/14/2009
Q6	0.3450	0.3463	0.3455	**0.3456**	2/2/2010
Q7	0.3715	0.3715	0.3705	**0.3712**	10/28/2009
Q8	0.2574	0.2560	0.2565	**0.2566**	7/10/2009
Q9	0.3700	0.3700	0.3695	**0.3698**	2/2/2010
Q10	0.3695	0.3705	0.3700	**0.3700**	8/5/2009
Q11	0.3735	0.3745	0.3750	**0.3743**	10/28/2009
Q12	0.3665	0.3665	0.3655	**0.3662**	2/2/2010
Q13	0.3665	0.3665	0.3675	**0.3668**	2/3/2010

Nozzle ID	Measurements			Averages	Date
Pyrex					
1	0.3115	0.3115	0.3105	**0.3112**	10/28/2009
2	0.3180	0.3165	0.3175	**0.3173**	9/23/2009
3	0.2595	0.2610	0.2605	**0.2603**	7/10/2009
4	0.2605	0.2615	0.2610	**0.2610**	7/10/2009
5	0.2625	0.2630	0.2630	**0.2628**	8/3/2009
6	0.2645	0.2650	0.2640	**0.2645**	8/3/2009
7	0.2640	0.2635	0.2645	**0.2640**	8/3/2009
8	0.2645	0.2650	0.2650	**0.2648**	8/3/2009
9	0.2570	0.2580	0.2580	**0.2576**	8/3/2009
10	0.3135	0.3140	0.3140	**0.3138**	10/28/2009
11	0.3100	0.3105	0.3110	**0.3105**	8/3/2009
12	0.3175	0.3130	0.3135	**0.3147**	5/1/2009
13	0.3175	0.3185	0.3190	**0.3183**	8/3/2009
14	0.3070	0.3085	0.3085	**0.3080**	5/1/2009
15	0.3130	0.3110	0.3120	**0.3120**	5/1/2009
16	0.3115	0.3115	0.3100	**0.3110**	5/1/2009
17	0.4925	0.4940	0.4940	**0.4935**	5/1/2009
18	0.5125	0.5135	0.514	**0.5133**	05/2009

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www.horizonengineering.com

January 12, 2010
Horizon Engineering Shop
Barometer Calibration

National Weather Service (PDX Int'l Airport)	29.82"Hg
TV 1	30.0"Hg
TV 2	29.8"Hg
TV 3	29.8"Hg
TV 4	30.0"Hg
Shop	30.1"Hg
Shortridge #1	30.1"Hg
Shortridge #2	30.0"Hg
Shortridge #3	29.8"Hg
Paul Heffernan's personnel wrist barometer	29.8"Hg

All pressures are absolute, read at the Horizon Engineering shop.
Margery P. Heffernan

0-10

SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (951) 653-6780 • FAX (951) 653-2430

10-26-09

Report Of Analysis
EPA Protocol Gas Mixtures

HENG01
TO: Horizon Engineering/Infrared NW
Attn: David Bagwell
13585 NE Whitaker Way
Portland, OR 97230
(503) 255-5050

REPORT NO: 56420-01
REPORT DATE: October 20, 2009
CUSTOMER PO NO: 1013

CYLINDER NUMBER: **CC83874** CYLINDER SIZE: 150A (141 std cu ft) CYLINDER PRESSURE: 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
Oxygen	11.50 ± 0.06 %	GMIS CYLINDER #: CC81204 @ 9.89 %	Varian Model 3800 Serial # Thermal Conductivity Gas Chromotography LAST CAL DATE: 10/12/2009	10/19/2012	10/19/2009 11.47 % 11.51 % 11.51 % MEAN: 11.50 %
Nitrogen	Balance				

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.

The above analyses are invalid if the cylinder pressure is less than 150 psig.

ANALYST: M.S.Calhoun APPROVED: J. T. Marrin

0-14

SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (951) 653-6780 • FAX (951) 653-2430

Report Of Analysis
EPA Protocol Gas Mixtures

HENG01
TO: Horizon Engineering/Infrared NW
Attn: David Bagwell
13585 NE Whitaker Way
Portland, OR 97230
(503) 255-5050

REPORT NO: 54924-01
REPORT DATE: December 31, 2008
CUSTOMER PO NO: 005363

CYLINDER NUMBER: **CA07129** CYLINDER SIZE: 150A (92 std cu ft) CYLINDER PRESSURE: 1300 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
Oxygen	22.26 ± 0.23 %	GMIS CYLINDER #: ALM031591 @ 24.39 %	Varian Model 3800 Serial # Thermal Conductivity Gas Chromotography LAST CAL DATE: 12/24/2008	12/26/2011 MEAN:	12/26/2008 22.25 % 22.25 % 22.27 % 22.26 %
Nitrogen	Balance				

ppm = umole/mole %= mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.

The above analyses are invalid if the cylinder pressure is less than 150 psig.

ANALYST: [signature] APPROVED: [signature]

M.S.Calhoun J. T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

11

SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (951) 653-6780 • FAX (951) 653-2430

01-12-10

Report Of Analysis
EPA Protocol Gas Mixtures

HENG01
TO: Horizon Engineering/Infrared NW
Attn: David Bagwell
13585 NE Whitaker Way
Portland, OR 97230
(503) 255-5050

REPORT NO: 56855-01
REPORT DATE: January 6, 2010
CUSTOMER PO NO: 1059

CYLINDER NUMBER: CC99500 **CYLINDER SIZE:** 150A (141 std cu ft) **CYLINDER PRESSURE:** 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
Carbon dioxide	6.01 ± 0.06 %	GMIS	Varian Model 3400	12/8/2011	12/8/2009	
		CYLINDER #:	Serial # 10680		6.01 %	
		CC83094	Thermal Conductivity		6.02 %	
		@ 8.08 %	Gas Chromotography		6.01 %	
			LAST CAL DATE: 11/9/2009	MEAN:	6.01 %	
Carbon monoxide	279.1 ± 1.2 ppm	GMIS	Carle Insts Model 8000	12/18/2011	12/10/2009	12/18/2009
		CYLINDER #:	Serial # 8249		279.2 ppm	279.0 ppm
		1L3309	Methanation/FID		278.8 ppm	279.0 ppm
		@ 283.2 ppmv	Gas Chromatography		279.0 ppm	279.3 ppm
			LAST CAL DATE: 12/15/2009	MEAN:	279.0 ppm	279.1 ppm
Nitric oxide	48.8 ± 0.3 ppm	GMIS	Bovar/W Res Model 922M	12/24/2011	12/8/2009	12/24/2009
NOx	48.8 ppm	CYLINDER #:	Serial # VD92284841		48.8 ppm	48.8 ppm
Nitrogen dioxide	< 0.2 ppm	CC28420	Continuous		48.6 ppm	48.8 ppm
		@ 50.6 ppmv	UV Photometry		48.7 ppm	48.7 ppm
			LAST CAL DATE: 12/24/2009	MEAN:	48.7 ppm	48.8 ppm
O2-free Nitrogen	Balance					

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
The above analyses are invalid if the cylinder pressure is less than 150 psig.

ANALYST: D.C. M[signature] APPROVED: [signature]
D.C.Marrin J. T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (951) 653-6780 • FAX (951) 653-2430

22

01-12-10

Report Of Analysis
EPA Protocol Gas Mixtures

HENG01
TO: Horizon Engineering/Infrared NW
Attn: David Bagwell
13585 NE Whitaker Way
Portland, OR 97230
(503) 255-5050

REPORT NO: 56855-02
REPORT DATE: January 6, 2010
CUSTOMER PO NO: 1059

CYLINDER NUMBER: **CC1859** CYLINDER SIZE: 150A (141 std cu ft) CYLINDER PRESSURE: 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
Carbon dioxide	12.38 ± 0.05 %	GMIS	Varian Model 3400	12/8/2011	12/8/2009	
		CYLINDER #:	Serial # 10680		12.35 %	
		CC51172	Thermal Conductivity		12.38 %	
		@ 18.01 %	Gas Chromotography		12.40 %	
			LAST CAL DATE: 11/9/2009	MEAN:	12.38 %	
Carbon monoxide	465 ± 4 ppm	GMIS	Carle Insts Model 8000	12/18/2011	12/10/2009	12/18/2009
		CYLINDER #:	Serial # 8249		465 ppm	465 ppm
		ALM021481	Methanation/FID		464 ppm	465 ppm
		@ 548 ppmv	Gas Chromatography		464 ppm	465 ppm
			LAST CAL DATE: 12/15/2009	MEAN:	464 ppm	465 ppm
Nitric oxide	89.0 ± 0.7 ppm	GMIS	Bovar/W Res Model 922M	1/5/2012	12/24/2009	1/5/2010
NOx	89.0 ppm	CYLINDER #:	Serial # VD92284841		89.1 ppm	88.8 ppm
Nitrogen dioxide	< 0.4 ppm	CC101293	Continuous		89.2 ppm	89.0 ppm
		@ 100.1 ppmv	UV Photometry		89.3 ppm	89.2 ppm
			LAST CAL DATE: 12/24/2009	MEAN:	89.2 ppm	89.0 ppm
O2-free Nitrogen	Balance					

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.

The above analyses are invalid if the cylinder pressure is less than 150 psig.

ANALYST: D.C. M [signature] APPROVED: [signature]

D.C.Marrin J. T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.
STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

QA/QC Documentation

Procedures

Analyzer Interference Response Data

Introduction The QA procedures outlined in the U. S. Environmental Protection Agency (EPA) test methods are followed, including procedures, equipment specifications, calibrations, sample extraction and handling, calculations, and performance tolerances. Many of the checks performed have been cited in the Sampling section of the report text. The results of those checks are on the applicable field data sheets in the Appendix.

Continuous Analyzer Methods Field crews operate the continuous analyzers according to the test method requirements, and Horizon's additional specifications. On site quality control procedures include:

- Analyzer calibration error before initial run and after a failed system bias or drift test (within ± 2.0% of the calibration span of the analyzer for the low, mid, and high-level gases or 0.5 ppmv absolute difference)
- System bias at low-scale (zero) and upscale calibration gases (within ± 5.0% of the calibration span or 0.5 ppmv absolute difference)
- Drift check (within ±3.0% of calibration span for low, and mid or high-level gases, or 0.5 ppmv absolute difference)
- System response time (during initial sampling system bias test)
- Checks performed with EPA Protocol 1 or NIST traceable gases
- Leak free sampling system
- Data acquisition systems record 10-second data points or one-minute averages of one second readings
- NO_2 to NO conversion efficiency (before each test)
- Purge time (= 2 times system response time and will be done before starting run 1, whenever the gas probe is removed and re-inserted into the stack, and after bias checks)
- Sample time (at least two times the system response time at each sample point)
- Sample flow rate (within approximately 10% of the flow rate established during system response time check)
- Interference checks for analyzers used will be included in the final test report
- Average concentration (run average = calibration span for each run)
- Stratification test (to be done during run 1 at three(3) or twelve(12) points according to EPA Method 7E; Method 3A, if done for molecular weight only, will be sampled near the centroid of the exhaust; stratification is check not normally applicable for RATAs)

Manual Equipment QC Procedures On site quality control procedures include pre- and post-test leak checks on trains and pitot systems. If pre-test checks indicate problems, the system is fixed and rechecked before starting testing. If post-test leak checks are not acceptable, the test run is voided and the run is repeated. Thermocouples and readouts are verified in the field to read ambient prior to the start of any heating or cooling devices. Nozzles are checked for nicks or dents and are measured on three diameters twice each year.

Sample Handling Samples taken during testing are handled to prevent contamination from other runs and ambient conditions. Sample containers are glass, Teflon™, or polystyrene (filter petri dishes) and are pre-cleaned by the laboratory and in the Horizon Engineering shop. Sample levels are marked on containers and are verified by the laboratory. All particulate sample containers are kept upright and are delivered to the laboratory by Horizon personnel.

Data Processing Personnel performing data processing double-check that data entry and calculations are correct. Results include corrections for field blanks and analyzer drift. Any abnormal values are verified with testing personnel and the laboratory, if necessary.

After results are obtained, the data processing supervisor validates the data with the following actions:

- verify data entry
- check for variability within replicate runs
- account for variability that is not within performance goals (check the method, testing, and operation of the plant)
- verify field quality checks

Equipment Calibrations Periodic calibrations are performed on each piece of measurement equipment according to manufacturers' specifications and applicable test method requirements. The Oregon Department of Environmental Quality (ODEQ) Source Testing Calibration Requirements sheet is used as a guideline. Calibrations are performed using primary standard references and calibration curves where applicable.

Thermocouples Thermocouples are calibration checked against an NIST traceable thermocouple and indicator system every six months at three points. Thermocouple indicators and temperature controllers are checked using a NIST traceable signal generator. Readouts are checked over their usable range and are adjusted if necessary (which is very unusual).

Pitots Every six months, S-type pitots are calibrated in a wind tunnel at three points against a standard pitot using inclined manometers. They are examined for dents and distortion to the alignment, angles, lengths, and proximity to thermocouples before each test. Pitots are protected with covers during storage and handling until they are ready to be inserted in the sample ports.

Dry Gas Meters Dry gas meters used in the manual sampling trains are calibrated at three rates using a standard dry gas meter that is never taken into the field. The standard meter is calibration verified by the Northwest Natural Gas meter shop once every year. Dry gas meters are post-test calibrated with documentation provided in test reports.

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Phone (503) 255-5050 • Fax (503) 255-0505
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INTERFERENCE RESPONSE TEST

Date of Test: 1/24/02 Name: Mike Eisele
Analyzer: Type / Model: O_2 / Servomex 1400 Serial Number: 000012

Test Gas	Concentration, ppmv or %	Analyzer Output Response, %	% of Span (25 %)
SO_2	170.3 ppmv	0.0	0.0
*CO_2	10.5%	0.0	0.0
**CO	510.6 ppmv	0.0	0.0

*Used bottle of CO_2 at 100% concentration and diluted it with 100% N2 to get a concentration of about 10% CO_2.

**Used CO mix cylinder with 2553 ppmv CO and diluted it with 100% N2 to get a concentration of about 500 ppmv.

Bias Check:

Test Gas	Concentration, %	Analyzer Output Response, %	Bias Check (%)
O_2	20.95	20.8	0.6

Performance Specifications:

Analyzer	EPA Ref. Method	Allowable Interference (% of analyzer span)	Gas Values To Introduce Into Analyzers (EPA Method 20)
SO_2	6C	7%	200±20 ppm
O_2	6C	7%	20.9±1 percent
CO_2	6C	7%	10±1 percent
CO	20	2%	500±50 ppm

Note: Concentration for SO_2 was slightly lower than listed; 170.3 ppmv was the closest concentration cylinder available at the time of the interference checks.

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INTERFERENCE RESPONSE TEST

Date of Test: 1/24/02 Name: Mike Eisele
Analyzer: Type / Model: CO_2 / Servomex 1400 Serial Number: 000050

Results:

Test Gas	Concentration, ppmv or %	Analyzer Output Response, %	% of Span (25 %)
SO_2	170.3 ppmv	0.0	0.0
O_2	20.95 %	0.0	0.0
**CO_2	10.5	10.5	0.0
*CO	510.6 ppmv	0.0	0.0

*Used CO mix cylinder with 2553 ppmv CO and diluted it with 100% N_2 to get a concentration of about 500 ppmv CO.

Bias Check:

Test Gas	Concentration, %	Analyzer Output Response, %	Bias Check (%)
**CO_2	10.5	10.5	0.0

** Used bottle of CO_2 at 100% concentration and diluted it with 100% N_2 to get a concentration of about 10% CO_2.

Performance Specifications:

Analyzer	EPA Ref. Method	Allowable Interference (% of analyzer span)	Gas Values To Introduce Into Analyzers (EPA Method 20)
SO_2	6C	7%	200±20 ppm
O_2	6C	7%	20.9±1 percent
CO_2	6C	7%	10±1 percent
CO	20	2%	500±50 ppm

Note: Concentration for SO_2 was slightly lower than listed; 170.3 ppmv was the closest concentration cylinder available at the time of the interference checks.

Correspondence

Source Test Plan and Correspondence

Permit (Selected Pages)

e-mailed
3/2/10

HORIZON ENGINEERING LLC

13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 255-5050 • Fax (503) 255-0505
www.horizonengineering.com

March 2, 2010

Project No. 3472

Mr. Gerry Pade
Puget Sound Clean Air Agency
1904 3rd Ave, Suite 105
Seattle, Washington 98101-3317

Ms. Madonna Narvaez
Environmental Engineer
USEPA Region 10, AWT-107
1200 Sixth Avenue
Seattle, Washington 98101

Re: Source Testing: Saint-Gobain Containers
5801 East Marginal Way S.
Seattle, Washington 98134

This correspondence is notice that Horizon Engineering is to do source testing for the above-referenced facility, scheduled for March 11, 2010. This will serve as the Source Test Plan unless changes are requested prior to the start of testing.

1. **Source to be Tested:** Glass Melting Furnace No. 5 (Inlet to the Cloud Chamber)

2. **Purpose of the Testing:** To demonstrate compliance with the National Emission Standard for Hazardous Air Pollutants for Glass Manufacturing Area Sources, 40 CFR Part 63, Subpart SSSSSS for affected sources.

3. **Source Description:** There are four glass-melting furnaces at the site. Furnaces No. 5 is oxy-fuel fired, with oxygen gas being used to support combustion rather than ambient air. This process results in greater overall energy efficiency, improved energy transfer to the glass, and a significant reduction in NO_x emissions. The primary fuel source of Furnace No. 5 is natural gas with additional energy input from electricity delivered through electrodes immersed in the glass (electric boosting).

4. **Pollutant to be Tested:** Chrome

5. **Test Methods to be Used:** Testing will be conducted in accordance with EPA Methods in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Appendix A, July 1, 2007.

Flow Rate:	EPA Methods 1 and 2 (S-type pitot w/ EPA Method 29 traverses)
CO_2 and O_2:	EPA Method 3/3A (integrated bag samples with NDIR and paramagnetic analyzers)
Moisture:	EPA Method 4 (incorporated with EPA Method 29)
Chrome:	EPA Method 29 (isokinetic impinger technique with analysis by ICP-OES/ICP-MS)

6. **Integrated Bag Gas Sampling:** EPA Method 3/3A will be sampled simultaneously and traversed with EPA Method 29 sampling probe. Tedlar bags will be filled off the exhaust of the sampling train.

7. **Quality Assurance /Quality Control (QA/QC):** Documentation of the procedures and results will be presented in the source test report for review. This documentation will include at least the following:

   Continuous analyzer QC procedures for Tedlar bags: Field crews will operate the analyzers according to the test method requirements and Horizon's additional specifications. On-site quality control procedures include:

   - Daily calibration (zero and span) and calibration error (linearity) checks
   - Tedlar bags will be analyzed after daily calibration and calibration error checks
   - Checks performed with EPA Protocol 1gases
   - Data acquisition systems record one-minute averages of one second readings

   Manual equipment QC procedures: Operators will perform pre- and post-test leak checks on the sampling system and pitot lines. Thermocouples attached to the pitots and probes are calibrated in the field using EPA Alternate Method 11. A single-point calibration on each thermocouple system using a reference thermometer is performed. Thermocouples must agree within ±2°F with the reference thermometer. Also, prior to use, thermocouple systems are checked for ambient temperature before heaters are started. Nozzles are inspected for nicks or dents and pitots are examined before and after each use to confirm that they are still aligned. Pre- and post-test calibrations on the meter boxes will be included with the report, along with semi-annual calibrations of critical orifices, pitots, nozzles and thermocouples (sample box impinger outlet and oven, meter box inlet and outlet, and thermocouple indicators). Blank reagents are submitted to the laboratory with the samples. Liquid levels are marked on sample jars in the field and are verified by the laboratory.

8. **Number of Sampling Replicates and their Duration:** Three (3) test runs of at least 120 minutes each.

9. **Reporting Units for Results:** Results will be expressed as concentrations (ppmv or gr/dscf), as rates (lb/hr), and on a production basis (lb/ton).

10. **Emission Limit:**

- Subpart SSSSSS Limit: 0.02 lb/ton

11. **Horizon Engrg. Contacts:** David Bagwell or
Preston Skaggs
(503) 255-5050
Fax (503) 255-0505
E-mail dbagwell@horizonengineering.com
pskaggs@horizonengineering.com

12. **Parent Company Contact:** Jayne Browning
(765) 741-7112
Mobile (765) 741-4846
Fax (765) 741-4846
E-mail jayne.e.browning@saint-gobain.com

13. **Source Site Personnel:** Marlon Trigg
(206) 768-6221
Mobile (206) 730-1888
Fax (206) 768-6266
E-mail Marlon.Trigg@saint-gobain.com

14. **Regulatory Contacts:** Gerry Pade
(206) 689-4065
Fax (206) 343-7522
E-mail gerryp@pscleanair.org
facilitysubmittal@pscleanair.org

Madonna Narvaez
(206) 553-2117
Fax (206) 553-0110
E-mail narvaez.madonna@epa.gov

15. **Applicable Process/Production/Control Information:** Operating data that characterize the source are considered to be:

- Fuel usage during each run
- Amount of glass melted
- All other normally recorded process information

Process/Production/Control information is to be gathered by the Source Site Personnel and provided to Horizon for inclusion in the report.

The source must operate at a normal maximum rate during testing.

16. **Other Considerations:**
    - It is requested that the sixty day test plan notification be waived because of the variability of the production schedule and the short time in which the green glass will be produced.
    - Each furnace exhaust has been checked for cyclonic flow during past testing and no cyclonic conditions exist at any exhaust. Cyclonic flow checks were done on September 22, 2005 and February 25, 2009 and are documented in those test reports.

17. **Administrative:** Unless notified prior to the start of testing, this test plan is considered to be approved for compliance testing of this source. A letter acknowledging receipt of this plan and agreement on the content (or changes as necessary) would be appreciated.

The Agency will be notified of any changes in source test plans prior to testing. It is recognized that significant changes not acknowledged, which could affect accuracy and reliability of the results, could result in test report rejection.

Source test reports will be prepared by Horizon Engineering and will include all results and example calculations, field sampling and data reduction procedures, laboratory analysis reports, and QA/QC documentation. Source test reports will be submitted to you within 60 days of the completion of the field work, unless another deadline is agreed upon. Saint-Gobain Containers should send one (1) hardcopy and one (1) electronic copy of the completed source test report to you at the address above.

Any questions or comments relating to this test plan should be directed to me.

Sincerely,

David Bagwell, QSTI
Managing Member
Horizon Engineering

cc: Jayne Browning, Saint-Gobain Containers, Inc.
Marlon Trigg, Saint-Gobain Containers, Inc.
Valerie Krulic, Saint-Gobain Containers, Inc.

pscleanair.org
Puget Sound Clean Air Agency

PUGET SOUND CLEAN AIR AGENCY

1904 3rd Ave Ste 105
Seattle WA 98101-3317
Telephone: (206)689-4052; Fax: (206)343-7522
<www.pscleanair.org>

facilitysubmittal@pscleanair.org

COMPLIANCE TEST NOTIFICATION

This Notification of intended action does not constitute approval by the Agency nor does it satisfy a requirement for a test plan, if one exists.

Agency Use Only: Reg No: ***Date Received:*** ***Date Logged:***

Facility Name: Saint-Gobain Containers

Facility Address (include city/state/zip):
5801 East Marginal Way South
Seattle, Washington 98134

Facility Contact Information for Test
Name: Marlon Trigg
Phone: 206-730-1888
Fax: 206-768-6266
E-Mail: Marlon.Trigg@saint-gobain.com

Test Contractor: Horizon Engineering

Test Contractor Mailing Address:
13585 NE Whitaker Way
Portland, Oregon 97230

Test Contractor Contact Information
Name: David Bagwell
Phone: 503-255-5050
Fax: 503-255-0505
E-Mail: dbagwell@horizonengineering.com

Testing Dates:

Emission Unit	Pollutant Tested	Test Method(s) (list all to be used)	Purpose for the Test (see Note below)
Glass Melting Furnace No. 5, Cloud Chamber Inlet	chrome	EPA 1, 2, 3/3A, 4, 29	40 CFR Part 63, Subpart SSSSSS

Any Test Method Deviations?
Yes *(attach explanation)* x No

Written Test Plan Required?
x Yes No Unknown

Attachments to this Notification? x Yes *(list below)* No
Test plan

Person Submitting Notification:
David Bagwell

Affiliation:
Horizon Engineering

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David Bagwell

From: Gerry Pade [GerryP@pscleanair.org]
Sent: Monday, March 08, 2010 2:06 PM
To: Browning, Jayne E.
Cc: David Bagwell; Trigg, Marlon; Tom Hudson
Subject: RE: Seattle Furnace 5

Jayne Browning
Saint-Gobain

Dear Ms. Browning,

I received the test plan and notification on 3/2/10. The failure to provide this information 60 days prior to the test is a violation of 40 CFR 63.7(b)(1) and the failure to request an audit sample 30 days prior to the test is a violation of Section 63.7(c)(4). However, I understand that Saint-Gobain needs a basis for certifying compliance with the chromium emission limit for the Tabasco bottle production run. I also understand that the production run will last only one week and that it wasn't possible to provide even the 21 days advance notice required under Section 3.07 of PSCAA Regulation I (AOP term.V.N.1).

Due to the abbreviated notification, Inspectors Hudson and McAfee are unable to observe the test. Instead, I will be accompanied by their supervisor, Mario Pedroza.

Please note that the final test report needs to be accompanied by a Notification of Compliance Status per Section 63.11456(b). And as with furnace 3, which was producing antique green during its test, a re-test will be required if and when the furnace produces glass with a higher chromium content. If you have any questions, please contact me.

Gerry Pade, Engineer
Puget Sound Clean Air Agency
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"Working together for clean air"
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From: Browning, Jayne E. [mailto:Jayne.E.Browning@saint-gobain.com]
Sent: Monday, March 01, 2010 1:51 PM
To: Gerry Pade
Cc: David Bagwell
Subject: Seattle Furnace 5

Gerry,

I learned over the weekend that Seattle Furnace #5 is now scheduled for a short production run of green glass that is potentially subject to the Glass NESHAP at 40 CFR Part 63, Subpart 6S. The run is scheduled to begin March 10, so SGCI is working with Horizon Engineering to schedule a source test on March 11, 2010. Horizon is preparing the official stack testing notification and will submit it to you very soon.

The stack testing notification will provide additional information, but I want to note two aspects of the stack testing. First, the test sampling will take place prior to the TriMer control device to demonstrate that Furnace #5 can meet the 0.02 lb/ton HAP emission limit without relying on additional emission reductions provided by the TriMer system.
Second, due to the small Tabasco bottle manufactured during this green glass production run, the anticipated draw rate will be approximately 75 tons/day. While this production rate is less than 50% of the overall furnace capacity, the March 11 green glass production still conservatively represents the maximum chromium emissions for comparison against the 0.02 lb/ton limit. Given the "lb/ton" unit for the Subpart 6S emission limit, the amount of the draw rate is less important than when comparing emissions against a lb/hr or ton/year emission threshold.

Although I am on the road at the moment, I am monitoring e-mails and have intermittent cell phone coverage. Please contact me if you have any questions.

Jayne Browning
Saint-Gobain Containers, Inc.
1509 S. Macedonia Ave., PO Box 4200
Muncie, IN 47307-4200
Phone: 765-741-7112
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4. Part 63 is amended by adding subpart SSSSSS to read as follows:

Subpart SSSSSS—National Emission Standards for Hazardous Air Pollutants for Glass Manufacturing Area Sources

Applicability and Compliance Dates

§ 63.11448 Am I subject to this subpart?

You are subject to this subpart if you own or operate a glass manufacturing facility that is an area source of hazardous air pollutant (HAP) emissions and meets all of the criteria specified in paragraphs (a) through (c) of this section.

(a) A glass manufacturing facility is a plant site that manufactures flat glass, glass containers, or pressed and blown glass by melting a mixture of raw materials, as defined in § 63.11459, to produce molten glass and form the molten glass into sheets, containers, or other shapes.

(b) An area source of HAP emissions is any stationary source or group of stationary sources within a contiguous area under common control that does not have the potential to emit any single HAP at a rate of 9.07 megagrams per year (Mg/yr) (10 tons per year (tpy)) or more and any combination of HAP at a rate of 22.68 Mg/yr (25 tpy) or more.

(c) Your glass manufacturing facility uses one or more continuous furnaces to produce glass that contains compounds of one or more glass manufacturing metal HAP, as defined in § 63.11459, as raw materials in a glass manufacturing batch formulation.

§ 63.11449 What parts of my plant does this subpart cover?

(a) This subpart applies to each existing or new affected glass melting furnace that is located at a glass manufacturing facility and satisfies the requirements specified in paragraphs (a)(1) through (3) of this section.

(1) The furnace is a continuous furnace, as defined in § 63.11459.

(2) The furnace is charged with compounds of one or more glass manufacturing metal HAP as raw materials.

(3) The furnace is used to produce glass, which contains one or more of the glass manufacturing metal HAP as raw materials, at a rate of at least 45 Mg/yr (50 tpy).

(b) A furnace that is a research and development process unit, as defined in § 63.11459, is not an affected furnace under this subpart.

(c) An affected source is an existing source if you commenced construction or reconstruction of the affected source on or before September 20, 2007.

(d) An affected source is a new source if you commenced construction or reconstruction of the affected source after September 20, 2007.

(e) If you own or operate an area source subject to this subpart, you must obtain a permit under 40 CFR part 70 or 40 CFR part 71.

§ 63.11450 What are my compliance dates?

(a) If you have an existing affected source, you must comply with the applicable emission limits specified in § 63.11451 of this subpart no later than December 28, 2009. As specified in section 112(i)(3)(B) of the Clean Air Act and in § 63.6(i)(4)(A), you may request that the Administrator or delegated authority grant an extension allowing up to 1 additional year to comply with the applicable emission limits if such additional period is necessary for the installation of emission controls.

(b) If you have a new affected source, you must comply with this subpart according to paragraphs (b)(1) and (2) of this section.

(1) If you start up your affected source on or before December 26, 2007, you must comply with the applicable emission limit specified in § 63.11451 no later than December 26, 2007.

(2) If you start up your affected source after December 26, 2007, you must comply with the applicable emission limit specified in § 63.11451 upon initial startup of your affected source.

(c) If you own or operate a furnace that produces glass containing one or more glass manufacturing metal HAP as raw materials at an annual rate of less than 45 Mg/yr (50 tpy), and you increase glass production for that furnace to an annual rate of at least 45 Mg/yr (50 tpy), you must comply with the applicable emission limit specified in § 63.11451 within 2 years of the date on which you increased the glass production rate for the furnace to at least 45 Mg/yr (50 tpy).

(d) If you own or operate a furnace that produces glass at an annual rate of at least 45 Mg/yr (50 tpy) and is not charged with glass manufacturing metal HAP, and you begin production of a glass product that includes one or more glass manufacturing metal HAP as raw materials, and you produce at least 45 Mg/yr (50 tpy) of this glass product, you must comply with the applicable emission limit specified in § 63.11451 within 2 years of the date on which you introduced production of the glass product that contains glass manufacturing metal HAP.

(e) You must meet the notification requirements in § 63.11456 according to the schedule in § 63.11456 and in 40 CFR part 63, subpart A. Some of the notifications must be submitted before you are required to comply with emission limits specified in this subpart.

Standards, Compliance, and Monitoring Requirements

§ 63.11451 What are the standards for new and existing sources?

If you are an owner or operator of an affected furnace, as defined in § 63.11449(a), you must meet the applicable emission limit specified in Table 1 to this subpart.

§ 63.11452 What are the performance test requirements for new and existing sources?

(a) If you own or operate an affected furnace that is subject to an emission limit specified in Table 1 to this subpart, you must conduct a performance test according to paragraphs (a)(1) through (3) and paragraph (b) of this section.

(1) For each affected furnace, you must conduct a performance test within 180 days after your compliance date and report the results in your Notification of Compliance Status, except as specified in paragraph (a)(2) of this section.

(2) You are not required to conduct a performance test on the affected furnace if you satisfy the conditions described in paragraphs (a)(2)(i) through (iii) of this section.

(i) You conducted a performance test on the affected furnace within the past 5 years of the compliance date using the same test methods and procedures specified in paragraph (b) of this section.

(ii) The performance test demonstrated that the affected furnace met the applicable emission limit specified in Table 1 to this subpart.

(iii) Either no process changes have been made since the test, or you can demonstrate that the results of the performance test, with or without adjustments, reliably demonstrate compliance with the applicable emission limit.

(3) If you operate multiple identical furnaces, as defined in § 63.11459, that are affected furnaces, you are required to test only one of the identical furnaces if you meet the conditions specified in paragraphs (a)(3)(i) through (iii) of this section.

(i) You must conduct the performance test while the furnace is producing glass that has the greatest potential to emit the glass manufacturing metal HAP from among the glass formulations that are used in any of the identical furnaces.

(ii) You certify in your Notification of Compliance Status that the identical furnaces meet the definition of identical furnaces specified in § 63.11459.

(iii) You provide in your Notification of Compliance Status documentation that demonstrates why the tested glass formulation has the greatest potential to emit the glass manufacturing metal HAP.

(b) You must conduct each performance test according to the requirements in § 63.7 and paragraphs (b)(1) through (12) and either paragraph (b)(13) or (b)(14) of this section.

(1) Install and validate all monitoring equipment required by this subpart before conducting the performance test.

(2) You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in § 63.7(e)(1).

(3) Conduct the test while the source is operating at the maximum production rate.

(4) Conduct at least three separate test runs with a minimum duration of 1 hour for each test run, as specified in § 63.7(e)(3).

(5) Record the test date.

(6) Identify the emission source tested.

(7) Collect and record the emission test data listed in this section for each run of the performance test.

(8) Locate all sampling sites at the outlet of the furnace control device or at the furnace stack prior to any releases to the atmosphere.

(9) Select the locations of sampling ports and the number of traverse points using Method 1 or 1A of 40 CFR part 60, appendix A–1.

(10) Measure the gas velocity and volumetric flow rate using Method 2, 2A, 2C, 2F, or 2G of 40 CFR part 60, appendices A–1 and A–2, during each test run.

(11) Conduct gas molecular weight analysis using Methods 3, 3A, or 3B of 40 CFR part 60, appendix A–2, during each test run. You may use ANSI/ASME PTC 19.10–1981, Flue and Exhaust Gas Analyses (incorporated by reference—see § 63.14) as an alternative to EPA Method 3B.

(12) Measure gas moisture content using Method 4 of 40 CFR part 60, appendix A–3, during each test run.

(13) To meet the particulate matter (PM) emission limit specified in Table 1 to this subpart, you must conduct the procedures specified in paragraphs (b)(13)(i) through (v) of this section.

(i) Measure the PM mass emission rate at the outlet of the control device or at the stack using Method 5 or 17 of 40 CFR part 60, appendices A–3 or A–6, for each test run.

(ii) Calculate the PM mass emission rate in the exhaust stream for each test run.

(iii) Measure and record the glass production rate (kilograms (tons) per hour of product) for each test run.

(iv) Calculate the production-based PM mass emission rate (g/kg (lb/ton)) for each test run using Equation 1 of this section.

$$MP = \frac{ER}{P} \qquad \text{(Equation 1)}$$

Where:

MP = Production-based PM mass emission rate, grams of PM per kilogram (pounds of PM per ton) of glass produced.

ER = PM mass emission rate measured using Methods 5 or 17 during each performance test run, grams (pounds) per hour.

P = Average glass production rate for the performance test, kilograms (tons) of glass produced per hour.

(v) Calculate the 3-hour block average production-based PM mass emission rate as the average of the production-based PM mass emission rates for each test run.

(14) To meet the metal HAP emission limit specified in Table 1 to this subpart, you must conduct the procedures specified in paragraphs (b)(14)(i) through (v) of this section.

(i) Measure the metal HAP mass emission rate at the outlet of the control device or at the stack using Method 29 of 40 CFR part 60, appendix A–8, for each test run.

(ii) Calculate the metal HAP mass emission rate in the exhaust stream for the glass manufacturing metal HAP that are added as raw materials to the glass manufacturing formulation for each test run.

(iii) Measure and record the glass production rate (kilograms (tons) per hour of product) for each test run.

(iv) Calculate the production-based metal HAP mass emission rate (g/kg (lb/ton)) for each test run using Equation 2 of this section.

$$MPM = \frac{ERM}{P} \qquad \text{(Equation 2)}$$

Where:

MPM = Production-based metal HAP mass emission rate, grams of metal HAP per kilogram (pounds of metal HAP per ton) of glass produced.

ERM = Sum of the metal HAP mass emission rates for the glass manufacturing metal HAP that are added as raw materials to the glass manufacturing formulation and are measured using Method 29 during each performance test run, grams (pounds) per hour.

P = Average glass production rate for the performance test, kilograms (tons) of glass produced per hour.

(v) Calculate the 3-hour block average production-based metal HAP mass emission rate as the average of the production-based metal HAP mass emission rates for each test run.

§ 63.11453 What are the initial compliance demonstration requirements for new and existing sources?

(a) If you own or operate an affected source, you must submit a Notification of Compliance Status in accordance with §§ 63.9(h) and 63.11456(b).

(b) For each existing affected furnace that is subject to the emission limits specified in Table 1 to this subpart, you must demonstrate initial compliance according to the requirements in paragraphs (b)(1) through (4) of this section.

(1) For each fabric filter that is used to meet the emission limit specified in Table 1 to this subpart, you must visually inspect the system ductwork and fabric filter unit for leaks. You must also inspect the inside of each fabric filter for structural integrity and fabric filter condition. You must record the results of the inspection and any maintenance action as required in § 63.11457(a)(6).

(2) For each electrostatic precipitator (ESP) that is used to meet the emission limit specified in Table 1 to this subpart, you must verify the proper functioning of the electronic controls for corona power and rapper operation, that the corona wires are energized, and that adequate air pressure is present on the rapper manifold. You must also visually inspect the system ductwork and ESP housing unit and hopper for leaks and inspect the interior of the ESP to determine the condition and integrity of corona wires, collection plates, hopper, and air diffuser plates. You must record the results of the inspection and any maintenance action as required in § 63.11457(a)(6).

(3) You must conduct each inspection specified in paragraphs (b)(1) and (2) of this section no later than 60 days after your applicable compliance date specified in § 63.11450, except as specified in paragraphs (b)(3)(i) and (ii) of this section.

(i) An initial inspection of the internal components of a fabric filter is not required if an inspection has been performed within the past 12 months.

(ii) An initial inspection of the internal components of an ESP is not required if an inspection has been performed within the past 24 months.

(4) You must satisfy the applicable requirements for performance tests specified in § 63.11452.

(c) For each new affected furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled with a fabric filter, you must install, operate, and maintain a bag leak detection system according to paragraphs (c)(1) through (3) of this section.

(1) Each bag leak detection system must meet the specifications and requirements in paragraphs (c)(1)(i) through (viii) of this section.

(i) The bag leak detection system must be certified by the manufacturer to be capable of detecting PM emissions at concentrations of 1 milligram per dry standard cubic meter (0.00044 grains per actual cubic foot) or less.

(ii) The bag leak detection system sensor must provide output of relative PM loadings. The owner or operator shall continuously record the output from the bag leak detection system using electronic or other means (e.g., using a strip chart recorder or a data logger).

(iii) The bag leak detection system must be equipped with an alarm system that will sound when the system detects an increase in relative particulate loading over the alarm set point established according to paragraph (c)(1)(iv) of this section, and the alarm must be located such that it can be heard by the appropriate plant personnel.

(iv) In the initial adjustment of the bag leak detection system, you must establish, at a minimum, the baseline output by adjusting the sensitivity (range) and the averaging period of the device, the alarm set points, and the alarm delay time.

(v) Following initial adjustment, you shall not adjust the averaging period, alarm set point, or alarm delay time without approval from the Administrator or delegated authority except as provided in paragraph (c)(1)(vi) of this section.

(vi) Once per quarter, you may adjust the sensitivity of the bag leak detection system to account for seasonal effects, including temperature and humidity, according to the procedures identified in the site-specific monitoring plan required by paragraph (c)(2) of this section.

(vii) You must install the bag leak detection sensor downstream of the fabric filter.

(viii) Where multiple detectors are required, the system's instrumentation and alarm may be shared among detectors.

(2) You must develop and submit to the Administrator or delegated authority for approval a site-specific monitoring plan for each bag leak detection system. You must operate and maintain the bag leak detection system according to the site-specific monitoring plan at all times. Each monitoring plan must describe the items in paragraphs (c)(2)(i) through (vi) of this section.

(i) Installation of the bag leak detection system;

(ii) Initial and periodic adjustment of the bag leak detection system, including how the alarm set-point will be established;

(iii) Operation of the bag leak detection system, including quality assurance procedures;

(iv) How the bag leak detection system will be maintained, including a routine maintenance schedule and spare parts inventory list;

(v) How the bag leak detection system output will be recorded and stored; and

(vi) Corrective action procedures as specified in paragraph (c)(3) of this section. In approving the site-specific monitoring plan, the Administrator or delegated authority may allow owners and operators more than 3 hours to alleviate a specific condition that causes an alarm if the owner or operator identifies in the monitoring plan this specific condition as one that could lead to an alarm, adequately explains why it is not feasible to alleviate this condition within 3 hours of the time the alarm occurs, and demonstrates that the requested time will ensure alleviation of this condition as expeditiously as practicable.

(3) For each bag leak detection system, you must initiate procedures to determine the cause of every alarm within 1 hour of the alarm. Except as provided in paragraph (c)(2)(vi) of this section, you must alleviate the cause of the alarm within 3 hours of the alarm by taking whatever corrective action(s) are necessary. Corrective actions may include, but are not limited to the following:

(i) Inspecting the fabric filter for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in PM emissions;

(ii) Sealing off defective bags or filter media;

(iii) Replacing defective bags or filter media or otherwise repairing the control device;

(iv) Sealing off a defective fabric filter compartment;

(v) Cleaning the bag leak detection system probe or otherwise repairing the bag leak detection system; or

(vi) Shutting down the process producing the PM emissions.

(d) For each new affected furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled with an ESP, you must install, operate, and maintain according to the manufacturer's specifications, one or more continuous parameter monitoring systems (CPMS) for measuring and recording the secondary voltage and secondary electrical current to each field of the ESP according to paragraphs (d)(1) through (13) of this section.

(1) The CPMS must have an accuracy of 1 percent of the secondary voltage and secondary electrical current, or better.

(2) Your CPMS must be capable of measuring the secondary voltage and secondary electrical current over a range that extends from a value that is at least 20 percent less than the lowest value that you expect your CPMS to measure, to a value that is at least 20 percent greater than the highest value that you expect your CPMS to measure.

(3) The signal conditioner, wiring, power supply, and data acquisition and recording system of your CPMS must be compatible with the output signal of the sensors used in your CPMS.

(4) The data acquisition and recording system of your CPMS must be able to record values over the entire range specified in paragraph (d)(2) of this section.

(5) The data recording system associated with your CPMS must have

a resolution of one-half of the required overall accuracy of your CPMS, as specified in paragraph (d)(1) of this section, or better.

(6) Your CPMS must be equipped with an alarm system that will sound when the system detects a decrease in secondary voltage or secondary electrical current below the alarm set point established according to paragraph (d)(7) of this section, and the alarm must be located such that it can be heard by the appropriate plant personnel.

(7) In the initial adjustment of the CPMS, you must establish, at a minimum, the baseline output by adjusting the sensitivity (range) and the averaging period of the device, the alarm set points, and the alarm delay time.

(8) You must install each sensor of the CPMS in a location that provides representative measurement of the appropriate parameter over all operating conditions, taking into account the manufacturer's guidelines.

(9) You must perform an initial calibration of your CPMS based on the procedures specified in the manufacturer's owner's manual.

(10) Your CPMS must be designed to complete a minimum of one cycle of operation for each successive 15-minute period. To have a valid hour of data, you must have at least three of four equally-spaced data values (or at least 75 percent of the total number of values if you collect more than four data values per hour) for that hour (not including startup, shutdown, malfunction, or out of control periods).

(11) You must record valid data from at least 90 percent of the hours during which the affected source or process operates.

(12) You must record the results of each inspection, calibration, initial validation, and accuracy audit.

(13) At all times, you must maintain your CPMS including, but not limited to, maintaining necessary parts for routine repairs of the CPMS.

(e) For each new affected furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled by a device other than a fabric filter or an ESP, you must prepare and submit a monitoring plan to EPA or the delegated authority for approval. Each plan must contain the information in paragraphs (e)(1) through (5) of this section.

(1) A description of the device;

(2) Test results collected in accordance with § 63.11452 verifying the performance of the device for reducing PM or metal HAP to the levels required by this subpart;

(3) Operation and maintenance plan for the control device (including a preventative maintenance schedule consistent with the manufacturer's instructions for routine and long-term maintenance) and continuous monitoring system;

(4) A list of operating parameters that will be monitored to maintain continuous compliance with the applicable emission limits; and

(5) Operating parameter limits based on monitoring data collected during the performance test.

§ 63.11454 What are the monitoring requirements for new and existing sources?

(a) For each monitoring system required by this subpart, you must install, calibrate, operate, and maintain the monitoring system according to the manufacturer's specifications and the requirements specified in paragraphs (a)(1) through (7) of this section.

(1) You must install each sensor of your monitoring system in a location that provides representative measurement of the appropriate parameter over all operating conditions, taking into account the manufacturer's guidelines.

(2) You must perform an initial calibration of your monitoring system based on the manufacturer's recommendations.

(3) You must use a monitoring system that is designed to complete a minimum of one cycle of operation for each successive 15-minute period.

(4) For each existing affected furnace, you must record the value of the monitored parameter at least every 8 hours. The value can be recorded electronically or manually.

(5) You must record the results of each inspection, calibration, monitoring system maintenance, and corrective action taken to return the monitoring system to normal operation.

(6) At all times, you must maintain your monitoring system including, but not limited to, maintaining necessary parts for routine repairs of the system.

(7) You must perform the required monitoring whenever the affected furnace meets the conditions specified in paragraph (a)(7)(i) or (ii) of this section.

(i) The furnace is being charged with one or more of the glass manufacturing metal HAP as raw materials.

(ii) The furnace is in transition between producing glass that contains one or more of the glass metal HAP as raw materials and glass that does not contain any of the glass manufacturing metal HAP as raw materials. The transition period begins when the furnace is charged with raw materials that do not contain any of the glass manufacturing metal HAP as raw materials and ends when the furnace begins producing a saleable glass product that does not contain any of the glass manufacturing metal HAP as raw materials.

(b) For each existing furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled with an ESP, you must meet the requirements specified in paragraphs (b)(1) or (2) of this section.

(1) You must monitor the secondary voltage and secondary electrical current to each field of the ESP according to the requirements of paragraph (a) of this section, or

(2) You must submit a request for alternative monitoring, as described in paragraph (g) of this section.

(c) For each existing furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled with a fabric filter, you must meet the requirements specified in paragraphs (c)(1) or (2) of this section.

(1) You must monitor the inlet temperature to the fabric filter according to the requirements of paragraph (a) of this section, or

(2) You must submit a request for alternative monitoring, as described in paragraph (g) of this section.

(d) For each new furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled with an ESP, you must monitor the voltage and electrical current to each field of the ESP on a continuous basis using one or more CPMS according to the requirements for CPMS specified in § 63.11453(d).

(e) For each new furnace that is subject to the emission limit specified in Table 1 to this subpart and is controlled with a fabric filter, you must install and operate a bag leak detection system according to the requirements specified in § 63.11453(c).

(f) For each new or existing furnace that is subject to the emission limit specified in Table 1 to this subpart and is equipped with a control device other than an ESP or fabric filter, you must meet the requirements in § 63.8(f) and submit a request for approval of alternative monitoring methods to the Administrator no later than the submittal date for the Notification of Compliance Status, as specified in § 63.11456(b). The request must contain the information specified in paragraphs (f)(1) through (5) of this section.

(1) Description of the alternative add-on air pollution control device (APCD).

(2) Type of monitoring device or method that will be used, including the sensor type, location, inspection

procedures, quality assurance and quality control (QA/QC) measures, and data recording device.

(3) Operating parameters that will be monitored.

(4) Frequency that the operating parameter values will be measured and recorded.

(5) Procedures for inspecting the condition and operation of the control device and monitoring system.

(g) If you wish to use a monitoring method other than those specified in paragraph (b)(1) or (c)(1) of this section, you must meet the requirements in § 63.8(f) and submit a request for approval of alternative monitoring methods to the Administrator no later than the submittal date for the Notification of Compliance Status, as specified in § 63.11456(b). The request must contain the information specified in paragraphs (g)(1) through (5) of this section.

(1) Type of monitoring device or method that will be used, including the sensor type, location, inspection procedures, QA/QC measures, and data recording device.

(2) Operating parameters that will be monitored.

(3) Frequency that the operating parameter values will be measured and recorded.

(4) Procedures for inspecting the condition and operation of the monitoring system.

(5) Explanation for how the alternative monitoring method will provide assurance that the emission control device is operating properly.

§ 63.11455 What are the continuous compliance requirements for new and existing sources?

(a) You must be in compliance with the applicable emission limits in this subpart at all times, except during periods of startup, shutdown, and malfunction.

(b) You must always operate and maintain your affected source, including air pollution control and monitoring equipment, according to the provisions in § 63.6(e)(1)(i).

(c) For each affected furnace that is subject to the emission limit specified in Table 1 to this subpart, you must monitor the performance of the furnace emission control device under the conditions specified in § 63.11454(a)(7) and according to the requirements in §§ 63.6(e)(1) and 63.8(c) and paragraphs (c)(1) through (6) of this section.

(1) For each existing affected furnace that is controlled with an ESP, you must monitor the parameters specified in § 63.11454(b) in accordance with the requirements of § 63.11454(a) or as specified in your approved alternative monitoring plan.

(2) For each new affected furnace that is controlled with an ESP, you must comply with the monitoring requirements specified in § 63.11454(d) in accordance with the requirements of § 63.11454(a) or as specified in your approved alternative monitoring plan.

(3) For each existing affected furnace that is controlled with a fabric filter, you must monitor the parameter specified in § 63.11454(c) in accordance with the requirements of § 63.11454(a) or as specified in your approved alternative monitoring plan.

(4) For each new affected furnace that is controlled with a fabric filter, you must comply with the monitoring requirements specified in § 63.11454(e) in accordance with the requirements of § 63.11454(a) or as specified in your approved alternative monitoring plan.

(5) For each affected furnace that is controlled with a device other than a fabric filter or ESP, you must comply with the requirements of your approved alternative monitoring plan, as required in § 63.11454(g).

(6) For each monitoring system that is required under this subpart, you must keep the records specified in § 63.11457.

(d) Following the initial inspections, you must perform periodic inspections and maintenance of each affected furnace control device according to the requirements in paragraphs (d)(1) through (4) of this section.

(1) For each fabric filter, you must conduct inspections at least every 12 months according to paragraphs (d)(1)(i) through (iii) of this section.

(i) You must inspect the ductwork and fabric filter unit for leakage.

(ii) You must inspect the interior of the fabric filter for structural integrity and to determine the condition of the fabric filter.

(iii) If an initial inspection is not required, as specified in § 63.11453(b)(3)(i), the first inspection must not be more than 12 months from the last inspection.

(2) For each ESP, you must conduct inspections according to the requirements in paragraphs (d)(2)(i) through (iii) of this section.

(i) You must conduct visual inspections of the system ductwork, housing unit, and hopper for leaks at least every 12 months.

(ii) You must conduct inspections of the interior of the ESP to determine the condition and integrity of corona wires, collection plates, plate rappers, hopper, and air diffuser plates every 24 months.

(iii) If an initial inspection is not required, as specified in § 63.11453(b)(3)(ii), the first inspection must not be more than 24 months from the last inspection.

(3) You must record the results of each periodic inspection specified in this section in a logbook (written or electronic format), as specified in § 63.11457(c).

(4) If the results of a required inspection indicate a problem with the operation of the emission control system, you must take immediate corrective action to return the control device to normal operation according to the equipment manufacturer's specifications or instructions.

(e) For each affected furnace that is subject to the emission limit specified in Table 1 to this subpart and can meet the applicable emission limit without the use of a control device, you must demonstrate continuous compliance by satisfying the applicable recordkeeping requirements specified in § 63.11457.

Notifications and Records

§ 63.11456 What are the notification requirements?

(a) If you own or operate an affected furnace, as defined in § 63.11449(a), you must submit an Initial Notification in accordance with § 63.9(b) and paragraphs (a)(1) and (2) of this section by the dates specified.

(1) As specified in § 63.9(b)(2), if you start up your affected source before December 26, 2007, you must submit an Initial Notification not later than April 24, 2008 or within 120 days after your affected source becomes subject to the standard.

(2) The Initial Notification must include the information specified in § 63.9(b)(2)(i) through (iv).

(b) You must submit a Notification of Compliance Status in accordance with § 63.9(h) and the requirements in paragraphs (b)(1) and (2) of this section.

(1) If you own or operate an affected furnace and are required to conduct a performance test, you must submit a Notification of Compliance Status, including the performance test results, before the close of business on the 60th day following the completion of the performance test, according to § 60.8 or § 63.10(d)(2).

(2) If you own or operate an affected furnace and satisfy the conditions specified in § 63.11452(a)(2) and are not required to conduct a performance test, you must submit a Notification of Compliance Status, including the results of the previous performance test, before the close of business on the compliance date specified in § 63.11450.

§ 63.11457 What are the recordkeeping requirements?

(a) You must keep the records specified in paragraphs (a)(1) through (8) of this section.

(1) A copy of any Initial Notification and Notification of Compliance Status that you submitted and all documentation supporting those notifications, according to the requirements in § 63.10(b)(2)(xiv).

(2) The records specified in § 63.10(b)(2) and (c)(1) through (13).

(3) The records required to show continuous compliance with each emission limit that applies to you, as specified in § 63.11455.

(4) For each affected source, records of production rate on a process throughput basis (either feed rate to the process unit or discharge rate from the process unit). The production data must include the amount (weight or weight percent) of each ingredient in the batch formulation, including all glass manufacturing metal HAP compounds.

(5) Records of maintenance activities and inspections performed on control devices as specified in §§ 63.11453(b) and 63.11455(d), according to paragraphs (a)(5)(i) through (v) of this section.

(i) The date, place, and time of inspections of control device ductwork, interior, and operation.

(ii) Person conducting the inspection.

(iii) Technique or method used to conduct the inspection.

(iv) Control device operating conditions during the time of the inspection.

(v) Results of the inspection and description of any corrective action taken.

(6) Records of all required monitoring data and supporting information including all calibration and maintenance records.

(7) For each bag leak detection system, the records specified in paragraphs (a)(7)(i) through (iii) of this section.

(i) Records of the bag leak detection system output;

(ii) Records of bag leak detection system adjustments, including the date and time of the adjustment, the initial bag leak detection system settings, and the final bag leak detection system settings; and

(iii) The date and time of all bag leak detection system alarms, the time that procedures to determine the cause of the alarm were initiated, the cause of the alarm, an explanation of the actions taken, the date and time the cause of the alarm was alleviated, and whether the alarm was alleviated within 3 hours of the alarm.

(8) Records of any approved alternative monitoring method(s) or test procedure(s).

(b) Your records must be in a form suitable and readily available for expeditious review, according to § 63.10(b)(1).

(c) You must record the results of each inspection and maintenance action in a logbook (written or electronic format). You must keep the logbook onsite and make the logbook available to the permitting authority upon request.

(d) As specified in § 63.10(b)(1), you must keep each record for a minimum of 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record.

You must keep each record onsite for at least 2 years after the date of each occurrence, measurement, maintenance, corrective action, report, or record, according to § 63.10(b)(1). You may keep the records offsite for the remaining three years.

Other Requirements and Information

§ 63.11458 What General Provisions apply to this subpart?

You must satisfy the requirements of the General Provisions in 40 CFR part 63, subpart A, as specified in Table 2 to this subpart.

§ 63.11459 What definitions apply to this subpart?

Terms used in this subpart are defined in the Clean Air Act, in § 63.2, and in this section as follows:

Air pollution control device (APCD) means any equipment that reduces the quantity of a pollutant that is emitted to the air.

Continuous furnace means a glass manufacturing furnace that operates continuously except during periods of maintenance, malfunction, control device installation, reconstruction, or rebuilding.

Cullet means recycled glass that is mixed with raw materials and charged to a glass melting furnace to produce glass. Cullet is not considered to be a raw material for the purposes of this subpart.

Electrostatic precipitator (ESP) means an APCD that removes PM from an exhaust gas stream by applying an electrical charge to particles in the gas stream and collecting the charged particles on plates carrying the opposite electrical charge.

Fabric filter means an APCD used to capture PM by filtering a gas stream through filter media.

Furnace stack means a conduit or conveyance through which emissions from the furnace melter are released to the atmosphere.

Glass manufacturing metal HAP means an oxide or other compound of any of the following metals included in the list of urban HAP for the Integrated Urban Air Toxics Strategy and for which Glass Manufacturing was listed as an area source category: arsenic, cadmium, chromium, lead, manganese, and nickel.

Glass melting furnace means a unit comprising a refractory-lined vessel in which raw materials are charged and melted at high temperature to produce molten glass.

Identical furnaces means two or more furnaces that are identical in design, including manufacturer, dimensions, production capacity, charging method, operating temperature, fuel type, burner configuration, and exhaust system configuration and design.

Particulate matter (PM) means, for purposes of this subpart, emissions of PM that serve as a measure of filterable particulate emissions, as measured by Methods 5 or 17 (40 CFR part 60, appendices A–3 and A–6), and as a surrogate for glass manufacturing metal HAP compounds contained in the PM including, but not limited to, arsenic, cadmium, chromium, lead, manganese, and nickel.

Plant site means all contiguous or adjoining property that is under common control, including properties that are separated only by a road or other public right-of-way. Common control includes properties that are owned, leased, or operated by the same entity, parent entity, subsidiary, or any combination thereof.

Raw material means minerals, such as silica sand, limestone, and dolomite; inorganic chemical compounds, such as soda ash (sodium carbonate), salt cake (sodium sulfate), and potash (potassium carbonate); metal oxides and other metal-based compounds, such as lead oxide, chromium oxide, and sodium antimonate; metal ores, such as chromite and pyrolusite; and other substances that are intentionally added to a glass manufacturing batch and melted in a glass melting furnace to produce glass. Metals that are naturally-occurring trace constituents or contaminants of other substances are not considered to be raw materials. Cullet and material that is recovered from a furnace control device for recycling into the glass formulation are not considered to be raw materials for the purposes of this subpart.

Research and development process unit means a process unit whose purpose is to conduct research and development for new processes and products and is not engaged in the manufacture of products for commercial sale, except in a de minimis manner

§ 63.11460 Who implements and enforces this subpart?

(a) This subpart can be implemented and enforced by the U.S. EPA, or a delegated authority such as your State, local, or tribal agency. If the U.S. EPA Administrator has delegated authority to your State, local, or tribal agency, then that agency has the authority to implement and enforce this subpart. You should contact your U.S. EPA Regional Office to find out if this subpart is delegated to your State, local, or tribal agency.

(b) In delegating implementation and enforcement authority of this subpart to a State, local, or tribal agency under 40 CFR part 63, subpart E, the authorities contained in paragraphs (b)(1) through (4) of this section are retained by the Administrator of the U.S. EPA and are not transferred to the State, local, or tribal agency.

(1) Approval of alternatives to the applicability requirements in §§ 63.11448 and 63.11449, the compliance date requirements in § 63.11450, and the emission limits specified in § 63.11451.

(2) Approval of a major change to test methods under § 63.7(e)(2)(ii) and (f) and as defined in § 63.90.

(3) Approval of major alternatives to monitoring under § 63.8(f) and as defined in § 63.90.

(4) Approval of major alternatives to recordkeeping under § 63.10(f) and as defined in § 63.90.

§ 63.11461 [Reserved]

Tables to Subpart SSSSSS of Part 63

As required in § 63.11451, you must comply with each emission limit that applies to you according to the following table:

TABLE 1 TO SUBPART SSSSSS OF PART 63—EMISSION LIMITS

For each. . .	You must meet one of the following emission limits. . .
1. New or existing glass melting furnace that produces glass at an annual rate of at least 45 Mg/yr (50 tpy) AND is charged with compounds of arsenic, cadmium, chromium, manganese, lead, or nickel as raw materials.	a. The 3-hour block average production-based PM mass emission rate must not exceed 0.1 gram per kilogram (g/kg) (0.2 pound per ton (lb/ton)) of glass produced; OR b. The 3-hour block average production-based metal HAP mass emission rate must not exceed 0.01 g/kg (0.02 lb/ton) of glass produced.

As stated in § 63.11458, you must comply with the requirements of the NESHAP General Provisions (40 CFR part 63, subpart A), as shown in the following table:

TABLE 2 TO SUBPART SSSSSS OF PART 63—APPLICABILITY OF GENERAL PROVISIONS TO SUBPART SSSSSS

Citation	Subject
§ 63.1(a), (b), (c)(1), (c)(2), (c)(5), (e)	Applicability.
§ 63.2	Definitions.
§ 63.3	Units and Abbreviations.
§ 63.4	Prohibited Activities.
§ 63.5	Construction/Reconstruction.
§ 63.6(a), (b)(1)–(b)(5), (b)(7), (c)(1), (c)(2), (c)(5), (e)(1), (f), (g), (i), (j)	Compliance with Standards and Maintenance Requirements.
§ 63.7	Performance Testing Requirements.
§ 63.8(a)(1), (a)(2), (b), (c)(1)–(c)(4), (c)(7)(i)(B), (c)(7)(ii), (c)(8), (d), (e)(1), (e)(4), (f).	Monitoring Requirements.
§ 63.9(a), (b)(1)(i)–(b)(2)(v), (b)(5), (c), (d), (h)–(j)	Notification Requirements.
§ 63.10(a), (b)(1), (b)(2)(i)–(b)(2)(xii)	Recordkeeping and Reporting Requirements.
§ 63.10(b)(2)(xiv), (c), (f)	Documentation for Initial Notification and Notification of Compliance Status.
§ 63.12	State Authority and Delegations.
§ 63.13	Addresses.
§ 63.14	Incorporations by Reference.
§ 63.15	Availability of Information.
§ 63.16	Performance Track Provisions.

■ 5. Part 63 is amended by adding subpart TTTTTT to read as follows:

Subpart TTTTTT—National Emission Standards for Hazardous Air Pollutants for Secondary Nonferrous Metals Processing Area Sources

What Is The Compliance Date?

- Existing Sources: December 28, 2009.
- New Sources: Upon initial startup.

What Are The Permitting Requirements?

- Affected facilities must obtain a Title V permit.

What Are The Impacts?

- Three glass plants are expected to have to add controls to comply with the rule.

What Records Are Required?

Reporting:

- Initial notification and notification of compliance status (may be combined), due 120 days after promulgation date
- Initial notification informs EPA that the facility is subject to the standards. Notification of compliance status provides certification of compliance with standards.
- No ongoing compliance reports to be required beyond Title V Requirements.

Recordkeeping:

- Records to include copies of notifications submitted to EPA, glass production data, and records of monitoring and inspections.
- Records to be maintained in a form suitable and readily available for expeditious review.

You can also contact your Regional EPA air toxics office at the following numbers:

Address	States	Website/ Phone Number
Region 1 1 Congress Street Suite 1100 Boston, MA 02114-2023	CT, MA, ME, NH, RI, VT	www.epa.gov/region1 (888) 372-7341 (617) 918-1650
Region 2 290 Broadway New York, NY 10007-1866	NJ, NY, PR, VI	www.epa.gov/region2 (212) 637-4023
Region 3 1650 Arch Street Philadelphia, PA 19103-2029	DE, MD, PA, VA, WV, DC	www.epa.gov/region3 (800) 241-1754 (215) 814-2196
Region 4 Atlanta Federal Center 61 Forsyth Street, SW Atlanta, GA 30303-8960	FL, NC, SC, KY, TN, GA, AL, MS	www.epa.gov/region4 (404) 562-9131
Region 5 77 West Jackson Blvd Chicago, IL 60604-3507	IL, IN, MI, WI, MN, OH	www.epa.gov/region5 (312) 353-3575 (312) 353-4145 (312) 886-3850
Region 6 1445 Ross Avenue Suite 1200 Dallas, TX 75202-2733	AR, LA, NM, OK, TX	www.epa.gov/region6 (800) 621-8431* 214-665-7171
Region 7 901 North Fifth Street Kansas City, KS 66101	IA, KS, MO, NE	www.epa.gov/region7 (800) 223-0425 (913) 551-7566
Region 8 1595 Wynkoop St. Denver, CO 80202-1129	CO, MT, ND, SD, UT, WY	www.epa.gov/region8 (800) 227-8917* (303) 312-6460
Region 9 75 Hawthorne Street San Francisco, CA 94105	CA, AZ, HI, NV, GU, AS, MP	www.epa.gov/region9 (415) 744-1197
Region 10 1200 Sixth Ave Seattle, WA 98101	AK, ID, WA, OR	www.epa.gov/region10 (800) 424-4372* (206) 553-2117

*For sources within the region only.

For More Information

Copies of the rule and other materials are located at :
www.epa.gov/ttn/atw/area/arearules.html

United States Environmental Protection Agency

December 2007

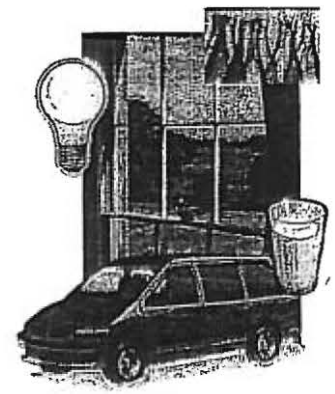
www.epa.gov/ttn/atw/eparules.html

Office of Air Quality Planning & Standards (EI 43-02)

EPA

Summary of Regulations Controlling Air Emissions for the

GLASS MANUFACTURING INDUSTRY



NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS NESHAP (SUBPART SSSSSS) FINAL RULE

GLASS MANUFACTURING
(SUBPART SSSSSS)

What Is An Area Source?

- Any source that is not a major source. (A major source is a facility that emits, or has the potential to emit in the absence of controls, at least 10 tons per year (TPY) of individual hazardous air pollutants (HAP) or 25 TPY of combined HAP.)

Who Does This Rule Apply To?

- Facilities with glass manufacturing furnaces producing at least 50 tons of glass per year.

Who Is Subject To The Rule?

- Glass manufacturing plants with continuous furnaces that process urban HAP metals (As, Cd, Cr, Pb, Mn, Ni) as raw materials (not including trace materials in non-HAP raw materials such as sand).

What Am I Required To Do?

- All affected sources must meet one of two emissions limits. New and existing sources have different monitoring requirements.

The charts on the following pages explain, in detail, how all affected glass manufacturers can comply with the rule.

Initial testing requirement:

- One-time performance test on each furnace unless the furnace has been tested in the last 5 years and the previous test demonstrated compliance.

	Monitoring Requirements	
	Baghouse	ESP
Existing	Inlet temperature monitoring: record every 15 minutes and record every 8 hours	ESP monitoring of the secondary voltage and secondary electrical current to each field of the ESP; measure every 15 minutes and record every 8 hours
New	Leak detectors	Install CPMS to measure and record the secondary voltage and secondary current to each field of the ESP
All Sources	Annual inspections of furnace control devices	
All Sources	Can submit a request for alternative monitoring under §60.8 or §63.8(f)	

Emission Limits	
Pollutant	Emission Limit*
Particulate Matter	0.2 lb/ton (0.1 g/kg)
Combined Urban HAP (As, Cd, Cr, Pb, Mn, Ni)	0.02 lb/ton (0.01 g/kg)

* Pounds emitted per ton of glass produced. (Grams emitted per kilogram of glass produced.)